User manual

CAREL
Technology & Evolution

We wish to save you time and money!
We can assure you that a thorough reading of this manual will guarantee correct installation and safe use of the product described.

IMPORTANT WARNINGS

BEFORE INSTALLING OR HANDLING THE APPLIANCE PLEASE CAREFULLY READ AND FOLLOW THE INSTRUCTIONS AND SAFETY STANDARDS DESCRIBED IN THIS MANUAL AND ILLUSTRATED ON THE LABELS ATTACHED TO THE MACHINE.

This humidifier produces non-pressurised steam using heating elements immersed in the water contained in the cylinder-boiler (hereafter **cylinder**); the steam thus produced is used to humidify environments or industrial processes, through special distributors.
The quality of the water used does not affect the evaporation process, and as a result the appliance can be supplied with untreated water, **as long as such water is fit for drinking, demineralised or softened** (see **Supply water characteristics**); the evaporated water is automatically returned using a refill valve.
To achieve uniform distribution of the heat flow, the heating elements, which are electrically insulated from the water, are covered in an aluminium casting, and are also available with a special non-stick coating to prevent and aid the removal of lime-scaling.

This appliance has been designed exclusively to directly humidify rooms or ducts, through distributors. It has been developed for this purpose, as long as: the installation, use and maintenance of the unit are carried out according to the instructions contained in this manual and on the labels applied, internally and externally, to the unit.
The environmental conditions and the voltage of the power supply must correspond to those specified.
All other uses and modifications made to the device which are not authorised by the manufacturer are considered incorrect.
Liability for injury or damage caused by the incorrect use of the device lies exclusively with the user.
Please note that the machine contains powered electrical devices and hot surfaces.
All service and/or maintenance operations must be performed by specialist and qualified personnel who are aware of the necessary precautions.
Disconnect the machine from the mains power supply before accessing any internal parts.
The local safety standards in force must be applied in all cases.

Approval: the quality and safety of Carel products are guaranteed by the company's **ISO 9001** certified design and production system, as well as the CE mark.

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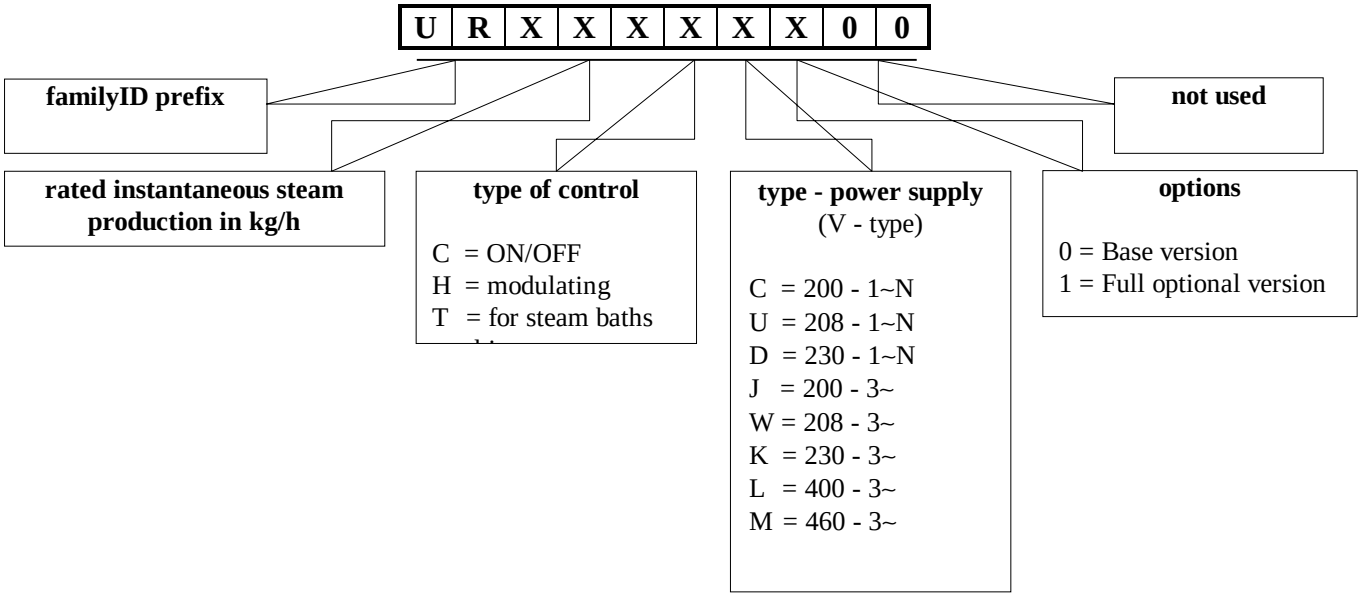
1. THE MODELS

The code designating the model of electrical heater humidifier is made up of 10 characters, with the following meaning:


U R X X X X X X 0 0
familyID prefix
rated instantaneous steam production in kg/h
type of control
C = ON/OFF
H = modulating
T = for steam baths
type - power supply
(V - type)
C = 200 - 1~N
U = 208 - 1~N
D = 230 - 1~N
J = 200 - 3~
W = 208 - 3~
K = 230 - 3~
L = 400 - 3~
M = 460 - 3~
not used
options
0 = Base version
1 = Full optional version

Example: the code UR010CL100 identifies a electrical heater humidifier (UR) with:
- nominal steam production of 10kg/h (010);
- ON/OFF control module (C);
- 400Vac, three-phase power supply (L);
- full optional version (1).

1.1 The accessories

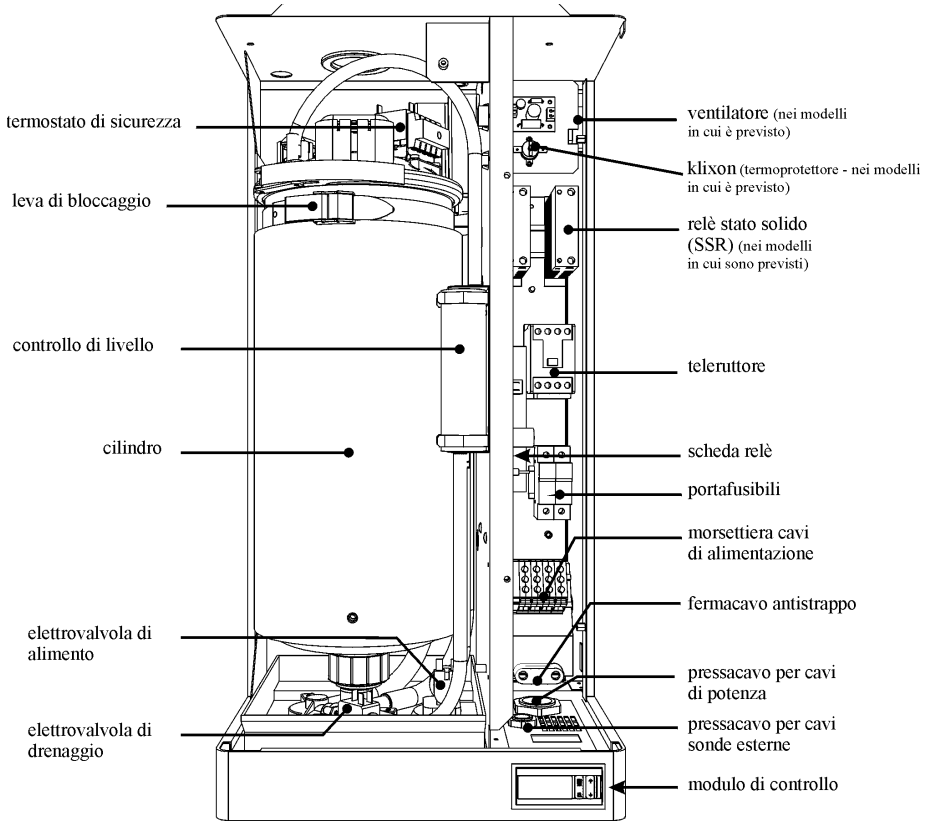
Table 1.1.1 lists the accessories fitted on the humidifiers, in the various configurations.

type of control module	**C** (ON/OFF)		**H** (modulating)		**T** (for steam baths)	
options	**0**: base	**1**: full optional	**0**: base	**1**: full optional	**0**: base	**1**: full optional
water temperature probe and pre-heater	--	--	incl.	incl.	incl.	incl.
thermal lining outside of cylinder	extra	incl.	option	incl.	option	incl.
deposit detection device	--	incl.	incl.	incl.	incl.	incl.
elements coated with non-stick film	extra	incl.	option	incl.	option	incl.
lime collection film	extra	incl.	option	incl.	option	incl.

Key: --: not available; incl.: accessory included; option: extra option

Tab. 1.1.1

2. DESCRIPTION OF THE MAIN COMPONENTS AND FUNCTIONS

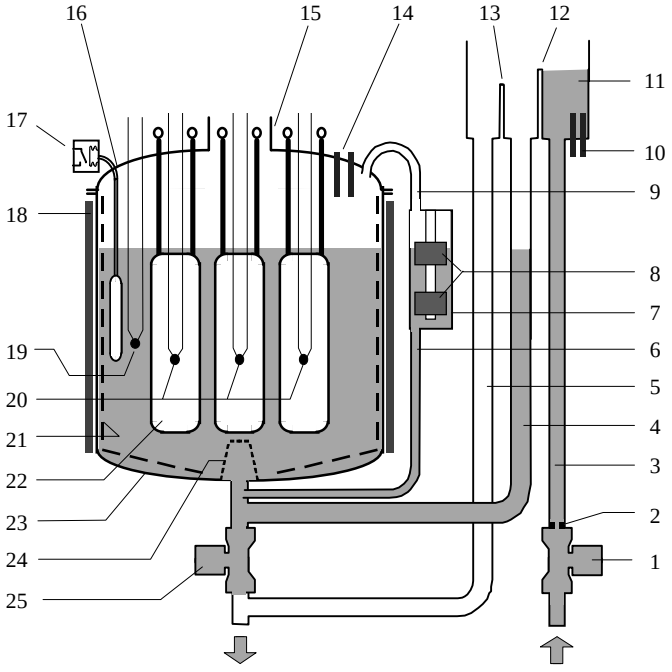


Ventilatore(nei modeli in cui è previsto) = *Fan (in models where featured)*
Klixon (termoprotettore) = *Klixon (circuit breaker - in models where featured)*
Relè stato solido = *Solid-state relay (in models where featured*)
Teleruttore = *Remote control switch*
Scheda relè = *Relay board*
Portafusibili = *Fuse holder*
Morsettiera cavi di alimentazione = *Power cable terminal block*
Fermacavo antistrappo = *Tear-proof cable clamp*
Pressacavo per cavi di potenza = *Fairlead for power cables*
Pressacavo per cavi sonde esterne = *Fairlead for external probe cables*
Modulo di controllo = *Control module*
Elettrovalvola di drenaggio = *Drain electrovalve*
Elettrovalvola di alimento = *Fill electrovalve*
Cilindro = *Cylinder*
Controllo di livello = *Level control*
Leva di bloccaggio = *Locking lever*
Termostato di sicurezza = *Safety thermostat*

Fig. 2.1

n.	description
1	fill electrovalve
2	flow limiter
3	supply tubing
4	refill tubing
5	overflow pipe
6	connection tube
7	level gauge housing
8	level control - level switches
9	equaliser tube
10	conductivity measurement electrodes
11	fill tank
12	fill diaphragm
13	overfill diaphragm
14	high level electrodes
15	steam outlet tube
16	cylinder cover
17	safety thermostat
18	cylinder thermal lining (optional)
19	water temperature sensor (optional)
20	overheating sensors (optional)
21	lime collection film
22	heating elements
23	cylinder housing
24	bottom filter
25	drain electrovalve

Tab. 2.1



2.1 Level control

Steam is produced with the heating elements completely immersed in the water, the level of which is controlled by a sensor made up of two independent and overlapping float switches, that is the working level switch and safety level switch.
The level control, housed in a transparent case to allow visual inspection, communicates with the cylinder through special tubing; a second tube, attached to the cylinder cover , equalises the pressure.

2.1.1 Working level switch

This switch, which activates the fill electrovalve, introduces water through the special tubing into the fill tank, from where, dropping from a fill diaphragm, it refills the level inside the cylinder; the fill electrovalve is fitted with a flow limiter, maintaining the flow basically constant on changes in mains pressure.

2.1.2 Safety level switch

This switch shuts off power to the elements, activating the alarm in the case where the level is insufficient.

2.2 Overfill device

This is a device used to avoid water exiting the cylinder over the safety level, due for example to the malfunctioning of the control module (for more details, see **THE HUMIDIFIER CONTROLLER**) or to leaking from the fill electrovalve.
The fill tank is fitted with an overfill diaphragm which deviates the excess inlet water, discharging it through special tubing.
The overfill diaphragm is lower than the fill diaphragm to avoid back flow through the supply tube.

2.3 Regulation of steam production

Steam production can be regulated either:

- By step, alternating steam production with standby using a humidistat or external contact; steam production can be regulated in four steps with pseudo-modulation from 30% to 100% of nominal power, cyclically activating the remote-control switch (**humidifier with type C control module**).
- By continuous modulation from 0% to 100% of nominal power, using solid state relays (SSR); the regulation logic is PWM (variation of the length of the impulse) with programmable base times (**humidifier with type H or T control module**).

2.4 Measurement of the conductivity of the supply water - alarm thresholds

To optimise the functionality of the humidifier by suitably portioning the automatic draining cycles (see **Automatic draining**), when the fill electrovalve is opened the conductivity of the inlet water is measured using the special electrodes in the fill tank.
Two high conductivity thresholds can be set to activate respectively a pre-alarm and an alarm (with the shut-down of the appliance) when these thresholds are exceeded for at least 60 minutes, or instantly if the value measured is greater than three times the set value.

2.5 Automatic draining

The automatic draining function is handled by the control module. Part of the water contained in the cylinder is drained automatically, being replaced by fresh water to prevent an excessive salt concentration following the evaporation process.
The drain electrovalve is opened for a pre-set time at intervals which vary automatically as a function of the steam production and the content of solids dissolved in the supply water, detected using the conductivity measuring electrodes.
Irrespective of the concentration of salt in the supply water, at least one draining cycle is performed within a maximum interval based on the quantity of steam produced; this is also true for demineralised supply water.

2.6 Foam elimination procedure

The level of water inside the cylinder is maintained by the level control at around 10-12cm from the top of the cylinder, and thus, when the high level electrodes are wet, an anomalous situation arises, generally caused by the presence of foam. In this case a drain procedure is activated, and is repeated until the phenomenon desists or, in the event of multiple activation, until the appliance is shut-down and an alarm state is signalled.

2.7 Safety thermostat

The mechanical safety thermostat with manual reset intervenes in the event of overheating, caused by a lack of water inside the cylinder due to the malfunctioning of the minimum level control. This deactivates the relay that controls the power supplied to the elements, and places the humidifier in an alarm state.

2.8 Autotest procedure

Each time the humidifier is started (switched from the OFF to the ON position), an autotest procedure is performed, including checks on the operation of the level control, to test the regular functioning of the appliance.
On start-up and on each draining cycle the operation of the level control is automatically checked by opening the fill electrovalve until the activation of the working level switch and, successively, opening the drain electrovalve until the activation of both level switches, and finally, restoring the correct level; in the event of a failed test or irregular timing the remote-control switch is automatically deactivated the alarm activated.

2.9 Measurement of the water temperature and pre-heating (not available in the version with type C control module)

The control module measures, using an NTC sensor, the temperature of the water, and can be programmed to activate the pre-heating function near the value set for the start of humidification; in this way, steam production occurs more quickly.

2.10 Dehumidification request signal (not available in the version with type C control module)

If activated, this function closes the relay contact when the relative humidity measured by the transducer connected to the control module exceeds the set threshold.
This signal can be used to activate an external dehumidification device.

2.11 Deposit detector for the heating elements (optional in the version with type C control module, standard in the versions with type H or T control module)

This patented device measures the resistance of the PTC temperature sensors inserted in the aluminium castings of the heating elements. In the event of overheating (caused by excessive lime deposits on the surface of the elements, or by low water level not detected by the level control), the overheating alarm is activated. In units with more than one element, the PTC temperature sensors are connected in series.

3. REGULATION PRINCIPLES

The range of humidifiers includes the following regulation possibilities.

3.1 ON/OFF regulation (control module C)

The action in this case is all or nothing, activated by an external contact which thus determines the Set Point and the regulation differential (or hysteresis).
Average steam production can be adjusted using a pseudo-modulating action, through the cyclical activation of the remote-control switch with a fractional actuation period (operation) that can be programmed in four steps: 30%, 50%, 75% or 100% of the total time (this mode can not be applied in severe operating conditions and without consequences on the noise level, caused by the frequent activation of the remote-control switch).

3.2 Modulating regulation (control module H)

The appliance is fitted with solid-state relays and thus steam production can be regulated continuously as a function of the required quantity, in one of the following modes.

3.2.1 ON/OFF regulation (parameter A0=0)

As for the type C control module (see **ON/OFF regulation (type C control module)**).
Slave regulation, with signal emitted from an external regulator (parameter A0=1)
Steam production is proportional to the value of an external signal **Y**, (selected by programming one of the following standards: 0÷1Vdc; 0÷10Vdc; 2÷10Vdc; 0÷20mA; 4÷20mA) the entire range of which is indicated by BP (proportional band).
The maximum production **Pmax**, corresponding to the maximum value of the external signal **Y**, can be programmed between 10% and 100% of the nominal value of the humidifier.
The minimum production **Pmin** is fixed at 10% of the nominal value, with an activation hysteresis provided by the value **hy**, equal to 2% of the entire range BP of the external signal **Y**.
If enabled, the pre-heating function overlaps the regulation diagram, and is activated when the external signal **Y** is lower than the activation point for steam production by a quantity **b2.**

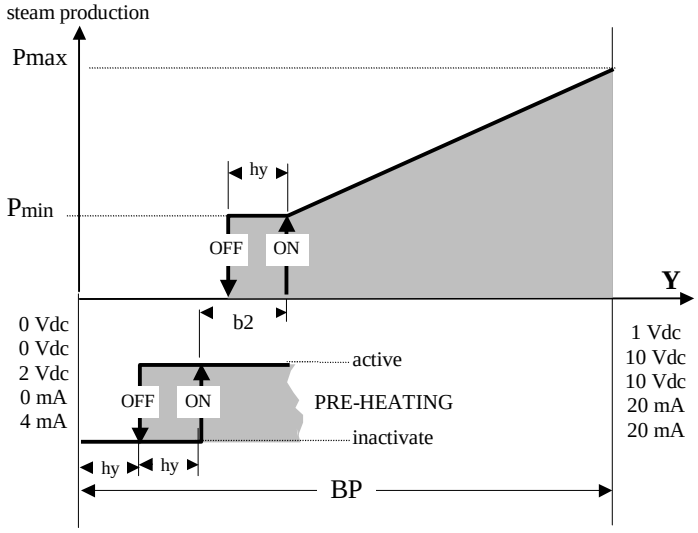


Fig. 3.2.2.1

3.2.2 Autonomous regulation with relative humidity transducer (parameter A0=2)

Steam production is linked to the measurement of % rH, performed by the relative humidity transducer connected to the regulator, and increases as the distance from the Set Point St increases.
The maximum production **P0**, which occurs when the relative humidity is less that the Set Point by a value **P1**, can be programmed between 10% and 100% of the nominal value of the humidifier.
The minimum production **Pmin** is fixed at 10% of the nominal value, with an activation hysteresis provided by the value **hy**, equal to 10% of P1.
The pre-heating function, if enabled, overlaps the regulation diagram and is activated when the relative humidity **% rH**, measured by the transducer, is higher than St by a programmable quantity b2.
The dehumidification function, if enabled, overlaps the regulation diagram and is activated when the relative humidity **% rH**, transmitted by the transducer, is higher than St by a programmable quantity **P5**+**P6**; the hysteresis of the step, also programmable, is equal to **P6**.

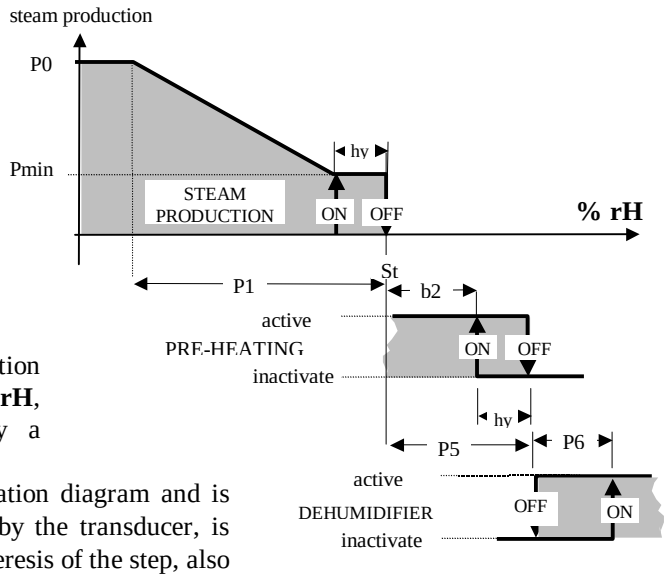


Fig. 3.2.3.1

To check that the relative humidity measured by the transducer is within the pre-set values, the control module with autonomous regulation allows two alarm thresholds to be programmed:

- high relative humidity alarm threshold **P2**;
- low relative humidity alarm threshold **P3**.

When these thresholds are exceeded, after a programmable delay **P4**, an alarm state is activated, with the closing of the contact of the corresponding relay on the main control board.

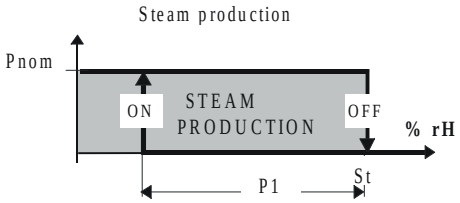


Fig. 3.2.3.2

With autonomous regulation (parameter A0=2) it is also possible to have an ON/OFF action, as represented in the graph, by disabling power modulation (setting parameter b0=0).
The pre-heating and/or dehumidification, if enabled, remain unchanged.

3.2.3 Autonomous regulation with ambient relative humidity transducer and supply humidity limiting transducer (parameter A0=3)

In this case too the regulator modulates steam production as a function of the measurement **% rH** performed by the **main** relative humidity transducer, however, in addition, its entity is limited if the relative humidity **% rH2** measured by a second **compensation** transducer placed in the humidifier air inlet duct exceeds the maximum desired value.
This limiting occurs by giving the command to decrease steam production proportionally to the difference between the measurement % rH2 of the supply relative humidity and the programmable threshold **P7**.
The compensation probe has its own Set Point **P7** and differential **P8**, based on which the limit of production is calculated. If the production required by the main transducer is greater than the limit, production will be equal to the limit itself.
To prevent the relative humidity measured by the transducer in the humidifier air inlet duct exceeding a value considered as excessive, the control module with autonomous regulation and second transducer connected allows a high supply relative humidity alarm threshold **P9**, to be programmed. If this threshold is exceeded, after a programmable delay **P4**, an alarm state is activated, with closing of the contact of the corresponding relay on the main control board.

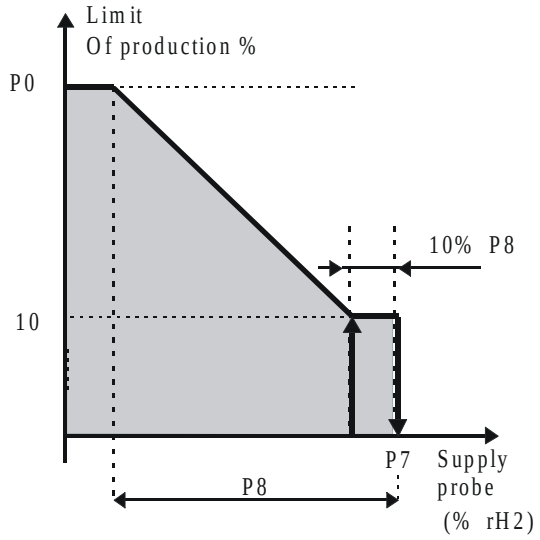


Fig. 3.2.4.1

3.2.4 Application for steam baths (type T control module)

In applications for steam baths, where the regulation probe measures temperature rather than humidity, the same considerations are valid as for the type H control module with modulating action and autonomous regulation.
Recommended transducer: **SSTOOB/P40 or ASET030001.**

3.3 Setting the alarm thresholds (type H or T control module)

The control module panel allows the setting of limit thresholds for the activation of the alarm in the event where these are exceeded.
These alarm thresholds can be programmed using the following regulation parameters:

- **P2**: high relative humidity alarm threshold, measured by the ambient probe;
- **P3**: low relative humidity alarm threshold, measured by the ambient probe;
- **P4**: alarm signalling delay (to prevent false signals);
- **P9**: high relative humidity alarm threshold, measured by the supply probe (for ducted humidification).

The parameters P2, P3, P4 are programmable only when A0=2 or 3; the parameter P9 is programmable only when A0=3.
Furthermore, the control module allows the signalling of excessive conductivity (and thus salt concentration) of the supply water, but only as a default setting.

WARNING: the parameter A0 and the functional alarm parameters Px and b0 are set in the factory (default values valid for normal applications). Nonetheless, these can be modified by the user, following the instructions contained in: **Reading and programming the parameters for the type H or T control module**.

4. MOUNTING THE UNIT

4.1 Receipt and storage

Check the integrity of the machine upon delivery and immediately notify the shipping agent, in writing, of all and any damage which may be the result of careless or incorrect transport. Move the machine to the place of installation before removing it from its packaging, holding the neck only from below the base. Open the cardboard box, remove the padding material and then the machine, keeping it vertical at all times; remove the protective bag only just prior to installation.

4.2 Dimensions and weights

		models					
	reference	**UR002**	**UR004**	**UR006**	**UR010**	**UR020**	**UR030**
dimensions (mm)	**A**	370	370	370	370		
	B	280	280	280	280		
	C	575	575	710	710		
weight (kg)	**packaged**	26	26	31	31		
	empty	21	21	26	26		
	installed *	27	27	35	35		

Tab. 4.2.1

*****: in operating conditions, filled with water

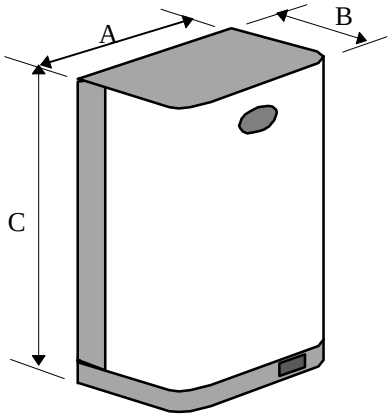


Fig. 4.2.1

4.3 Removing and replacing the front casing

To **remove** the front casing of the humidifier, proceed as follows:
1. turn the oval badge with the Carel logo 90°, until the ground screw below can be seen;
2. remove the screw, using a screwdriver;
3. grip the casing by the sides and lift it around 2 centimetres, releasing the contours from the raised edges on the cover and the base of the structure;
4. remove the casing by pulling it forward.

To **close** the appliance, proceed as follows:
1. turn the red oval plate with the Carel logo so that the fastening hole below is visible;
2. slide the casing onto the structure, keeping it in a slightly raised position, until it rests on the edges of the rear piece; then move it downwards slotting the upper and lower contours into the edges of the cover and the base of the structure respectively; check that the fastening hole below the logo is in line with the threaded bush attached to the structure;
3. fasten the ground screw using a screwdriver;
4. place (rotate) the oval plate with the Carel logo in the closed position.

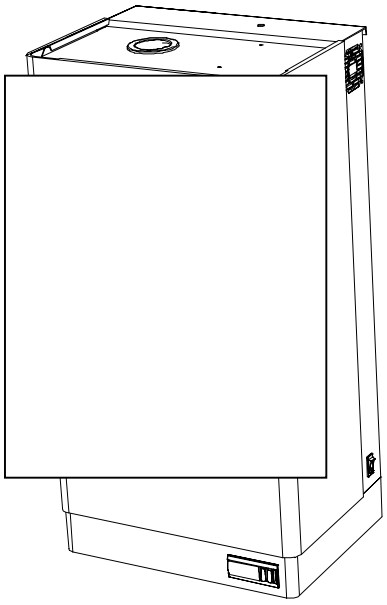


Fig. 4.3.1

5. POSITIONING THE UNIT

The humidifier must be positioned and fastened by qualified technical personnel, following the instructions listed herein.

Choose the best location for the installation of the steam distributor, that is the position which minimises the length of the steam tubing or, in the case of direct ambient humidification using a ventilated distributor, the central point of the space being humidified (see **STEAM DISTRIBUTION**). The unit is designed to be mounted to a wall which must be able to support its weight in operating conditions (see **Dimensions and weights**).
The metal casing of the humidifier heats up during operation, and the rear part resting against the wall may reach temperatures above 60°C; thus ensure that this does not cause any problems. Make sure the machine is level, respecting the minimum distances indicated in the drawing, to allow the necessary maintenance operations.
WARNING: ensure that the cooling fan outlet grid is not blocked or covered.

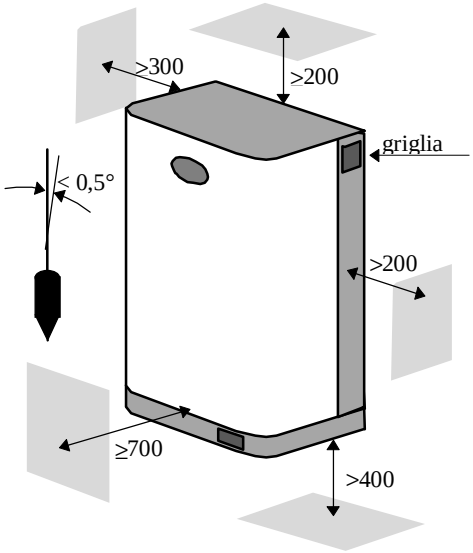


Fig. 5.1

5.1 Fastening

The appliance must be fastened to the wall using three screws: two upper screws,
to fasten the support bracket, and a lower, central screw, for anchoring. Use the following distances for the drilling template.

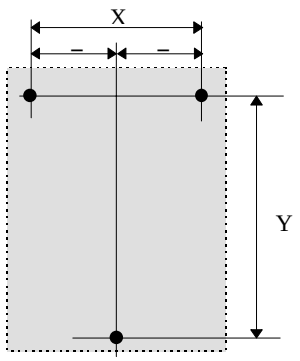
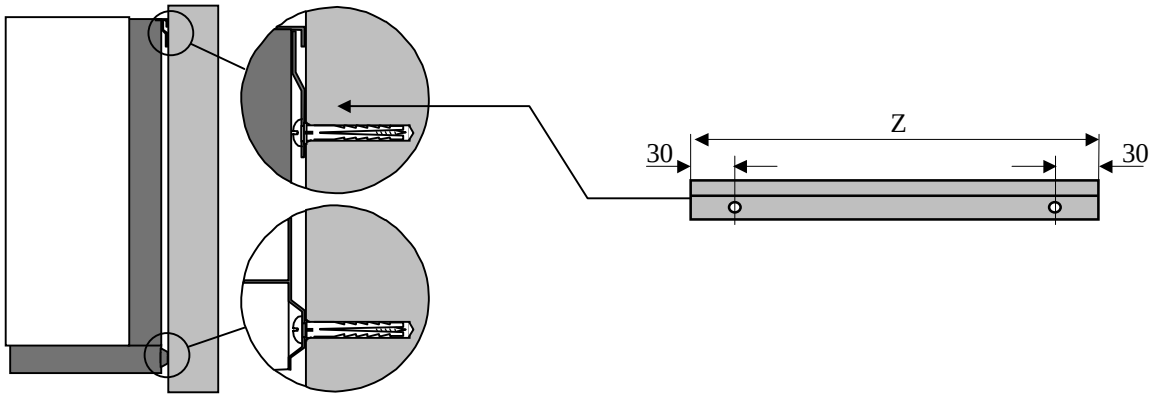


Fig. 5.1.1

	models		
	UR002 UR004	**UR006 UR010**	**UR020 UR030**
X (mm)	220	220	
Y (mm)	520	654	
Z (mm)	280	280	

Tab. 5.1.1

Fasten the bracket supplied with the humidifier to the wall, **checking that it is horizontal using a spirit level**; if it is mounted to a brick wall, the plastic wall plugs (Ø 8mm) and screws (Ø 5mm x L = 50mm) supplied can be used.



Hang the appliance on the bracket using the contour on the upper edge of the rear of the unit.
Finally, fasten the appliance to the wall using the hole in the centre rear of the base. This can be easily reached from the bottom.

6. HYDRAULIC CONNECTIONS

The hydraulic connections for the supply and the draining of the unit must be made by specialist and qualified personnel, who are capable of performing the work correctly and according to local standards. Before making the connections, ensure that the machine is disconnected from the mains power.

6.1 Supply water characteristics

The supply water for the electrical heater humidifier not must be corrosive, must not emit bad odours, must not contain too much lime to avoid excessive deposits.
The water, supplied from mains **drinking** water or **demineralised** water, must have the following characteristics:

pressure between 1 and 8 bar	chloride content < 50mg/l	hardness not greater than 40°fH (equal to 400 ppm as $CaCO_3$)
temperature between 1 and 50°C	low chlorine content	
phosphate content < 5mg/l	low CO_2 content	absence of organic compounds

Tab. 6.1.1

Note that treating the water with softeners or polyphosphates does not decrease the quantity of dissolved salts, and can lead to the formation of foam and hence irregular operation.

Not recommended:
1. the use of well water, industrial water or water from cooling circuits and, in general, water which may be chemically or bacteriologically contaminated;
2. the addition to the water of disinfectants or anticorrosion compounds, as these may cause irritation.

Note: no relationship can be proven between water hardness and conductivity; nonetheless, as an indication only, water with a hardness of 40°fH should have an approximate conductivity of around 900-1000µS/cm at 20^0C.

6.2 Characteristics of the drain water

Inside the humidifier water boils and steam is produced, without the addition of any kind of substance. The drain water, therefore, contains the same substances as those dissolved in the supply water, yet in a greater proportion, depending on the concentration in the supply water and the set drain cycles; it can also reach a temperature of 100°C. Not being toxic, it can be drained into the backwater collection system. The drain tubing, as well as being resistant to high temperatures, must also guarantee the correct downflow of the water; a downward slope of at least 5° is therefore recommended.

6.3 Technical specifications

The installation of the humidifier requires connection to the supply and drain water tubing.

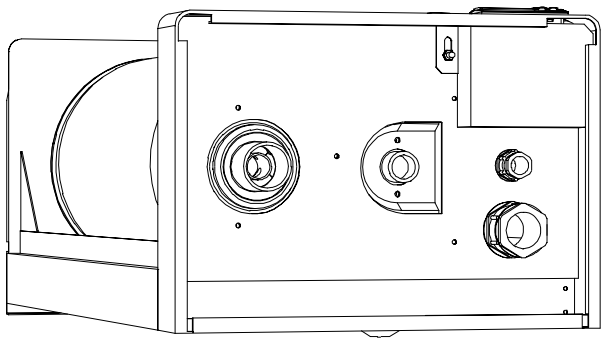


Fig. 6.3.1

The connection of the supply water can be made using rigid or flexible tubing with a minimum recommended internal diameter of 6mm, fitted with a shut-off tap to allow the appliance to be disconnected during maintenance operations.
To simplify installation it is recommended to use Carel flexible tubing with an internal diameter of 6mm and an external diameter of 8mm (code 1312350APN) and the rotating ¾"G straight (code 9995727ACA) or elbow connector (code 9995728ACA), available upon request.
It is recommended to install a mechanical filter to trap any solid impurities.

The drain water connection is made using a section of rubber or plastic tubing resistant to temperatures of 100 °C, with a recommended internal diameter of 36 mm.
This section of tubing must be fastened using metal clamps:
- above, onto the appliance outlet pipe coupling;
- below, onto the rigid tubing, with a minimum slope of 5°.

6.3.1 Table of technical specifications

	models					
technical specifications	**UR002**	**UR004**	**UR006**	**UR010**	**UR020**	**UR030**
maximum instantaneous flow rate for supply water (l/min.)	0.6	0.6	1.2	1.2		
supply water connection	G¾"M	G¾"M	G¾"M	G¾"M		
supply tubing minimum recommended internal diameter (mm)	6	6	6	6		
maximum instantaneous flow rate for drain water (l/min)	5	5	5	5		
drain water connection external diameter (mm)	40	40	40	40		
drain tubing recommended internal diameter (mm)	36	36	36	36		

Tab. 6.3.1

6.3.2 Diagram of hydraulic connections

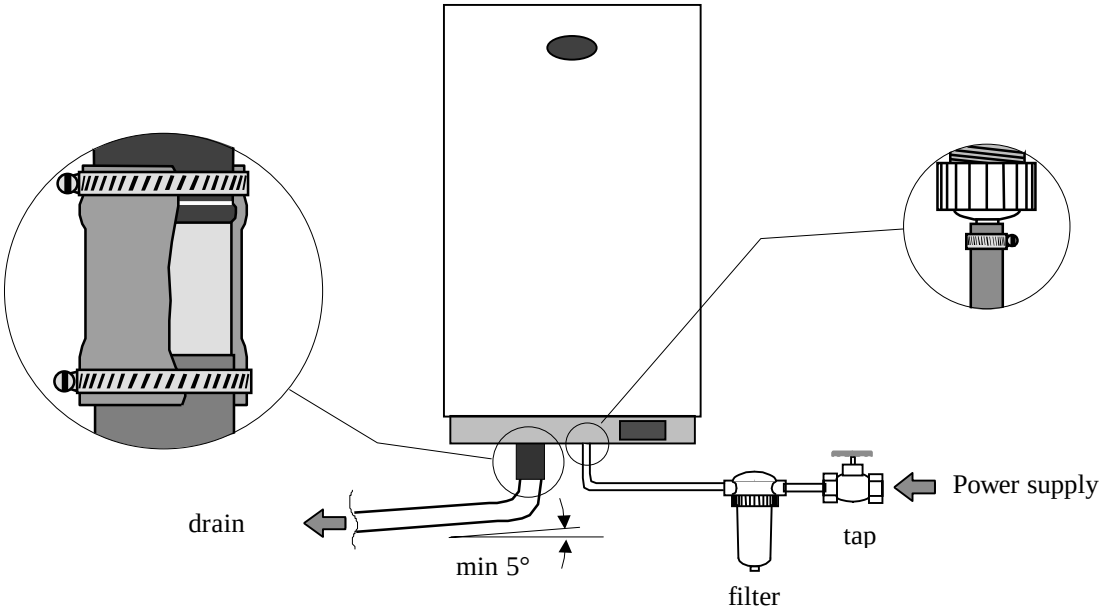


Fig. 6.3.2.1

IMPORTANT WARNING: the discharge tubing must be free, without back-pressure and with a drain trap immediately downstream from the connection to the humidifier.

6.4 Checks

The following conditions represent correct hydraulic connection:

- disconnection of the supply water line using a shut-off tap;
- presence of a mechanical filter in the supply water line;
- water temperature and pressure within the acceptable values;
- drain tubing resistant to temperatures of 100°C;
- drain tubing minimum internal diameter of 36 mm;
- minimum slope of drain tubing greater than or equal to 5°.

IMPORTANT WARNING: on completion of the installation procedure, drain the supply tubing for around 30 minutes by passing water directly through the tubing and without introducing it into the humidifier. This will allow the elimination of any scoria and processing residues which may cause the formation of foam during the boiling process.

7. ELECTRICAL CONNECTIONS

The electrical connections must be made by specialist and qualified personnel, who are capable of performing the work correctly and according to local standards. Before making the connections, ensure that the machine is disconnected from the mains power.

Check that the voltage of the appliance's power supply corresponds to the value indicated on the data plate inside the electrical panel . Introduce the power and ground connection cables into the electrical panel through the fairlead supplied, connect the ends to the terminals and fasten them in place using the special tear-proof cable clamp (see Fig. 2.1). The power line to the humidifier must be fitted with a cut-off switch and fuses protecting against short-circuits, to be mounted by the installer. Table 7.1.1 shows the recommended cross-sections of the power cable and the recommended sizes of the fuses; note, however, that this data is purely indicative and, in the event of non-conformity with local standards, the latter must prevail.

7.1 Power supply voltages

Table 7.1.1 lists the electrical data regarding the power supply voltages of the various models and the functional characteristics of each. Note that some models may be powered at different voltages, obviously with different consumption and steam production values.

	power supply		**nominal characteristics**								
base model	code	voltage (1) (V - type)	elements (2) (n^o x Ω)	connec-tion type (3)	current (2) (A)	power (2) (kW)	production (2; 5) (kg/h)	**cable c.sec.** (4) (mm^2)	**line fuses** (4) (A / type)	**wiring diagram** (Fig.)	**element connection wiring diagram** (Fig.)
UR002	**C**	200 - 1~N	1 x 29.5	-	6.8	1.4	1.8	2.5	16 / fast-blow	7.9.1 and 7.10.1	7.8.4
	U	208 - 1~N	1 x 29.5	-	7	1.5	2	2.5	16 / fast-blow	7.9.1 and 7.10.1	7.8.4
	D	230 - 1~N	1 x 29.5	-	7.8	1.8	2.4	2.5	16 / fast-blow	7.9.1 and 7.10.1	7.8.4
UR004	**C**	200 - 1~N	1 x 17.6	-	11.3	2.3	3	2.5	20 / fast-blow	7.9.1 and 7.10.1	7.8.4
	U	208 - 1~N	1 x 17.6	-	11.8	2.5	3.2	2.5	20 / fast-blow	7.9.1 and 7.10.1	7.8.4
	D	230 - 1~N	1 x 17.6	-	13	3	4	2.5	25 / fast-blow	7.9.1 and 7.10.1	7.8.4
UR006	**C**	200 - 1~	3 x 26.7	≡	22.5	4.5	6	10	40 / fast-blow	7.11.1 and 7.12.1	7.8.3
	U	208 - 1~	3 x 28.1	≡	22.2	4.6	6.1	10	40 / fast-blow	7.11.1 and 7.12.1	7.8.3
	D	230 - 1~	3 x 35.3	≡	19.6	4.5	6	10	40 / fast-blow	7.11.1 and 7.12.1	7.8.3
	J	200 - 3~	3 x 26.7	Δ	3 x 13.0	4.5	6.0	2.5	20 / fast-blow	7.13.1 and 7.14.1	7.8.2
	W	208 - 3~	3 x 28.1	Δ	3 x 12.8	4.9	6.5	2.5	20 / fast-blow	7.13.1 and 7.14.1	7.8.2
	K	230 - 3~	3 x 35.3	Δ	3 x 11.3	4.5	6.0	2.5	16 / fast-blow	7.13.1 and 7.14.1	7.8.2
	L	380 - 3~	3 x 35.3	Y	3 x 6.2	4.1	5.5	2.5	10 / fast-blow	7.13.1 and 7.14.1	7.8.1
		400 - 3~	3 x 35.3	Y	3 x 6.5	4.5	6.0	2.5	10 / fast-blow	7.13.1 and 7.14.1	7.8.1
	M	440 - 3~	3 x 47.0	Y	3 x 5.4	4.1	5.5	2.5	10 / fast-blow	7.13.1 and 7.14.1	7.8.1
		460 - 3~	3 x 47.0	Y	3 x 5.7	4.5	6.0	2.5	10 / fast-blow	7.13.1 and 7.14.1	7.8.1
UR010	**J**	200 - 3~	3 x 16.0	Δ	3 x 21.7	7.5	10.0	6	40 / fast-blow	7.13.1 and 7.14.1	7.8.2
	W	208 - 3~	3 x 17.3	Δ	3 x 20.8	6.1	8.1	6	40 / fast-blow	7.13.1 and 7.14.1	7.8.2
	K	230 - 3~	3 x 21.3	Δ	3 x 18.8	7.5	10.0	6	40 / fast-blow	7.13.1 and 7.14.1	7.8.2
	L	380 - 3~	3 x 21.3	Y	3 x 10.3	6.8	9.0	2.5	16 / fast-blow	7.13.1 and 7.14.1	7.8.1
		400 - 3~	3 x 21.3	Y	3 x 10.9	7.5	10.0	2.5	16 / fast-blow	7.13.1 and 7.14.1	7.8.1
	M	440 - 3~	3 x 28.1	Y	3 x 9.0	6.9	9.2	2.5	16 / fast-blow	7.13.1 and 7.14.1	7.8.1
		460 - 3~	3 x 28.1	Y	3 x 9.4	7.5	10.0	2.5	16 / fast-blow	7.13.1 and 7.14.1	7.8.1
UR020											
UR030											

Tab. 7.1.1

(1) Tolerance allowed on nominal mains voltage: ± 10 %.
(2) Tolerance on nominal values: +5%, -10% (EN 60335-1).
(3) -: single-phase; ≡: single-phase in parallel; Δ: delta; Y: star.
(4) Recommended values; referred to the laying of the cable in closed PVC or rubber raceways with a length of 20m; the standards in force must in any case be followed.
(5) **Instantaneous** steam production**:** the average steam production may be influenced by external factors, such as: ambient temperature, water quality, steam distribution system.

7.2 Checking the voltage of the auxiliary circuit transformer

The multi-voltage toroidal transformer for the auxiliary circuits has four primary windings (for the voltages: 200-208V, 230V, 400V, 440-460V) and one secondary winding (24V).
The connection is made and checked in the factory, according to the voltage shown on the specification plate.
In the event of a change in the voltage of the power supply or intervention on the electrical panel, before powering the appliance, check the exactness of the connection (check wiring diagram).

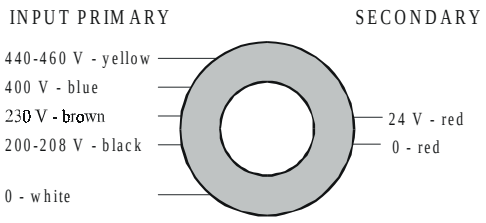
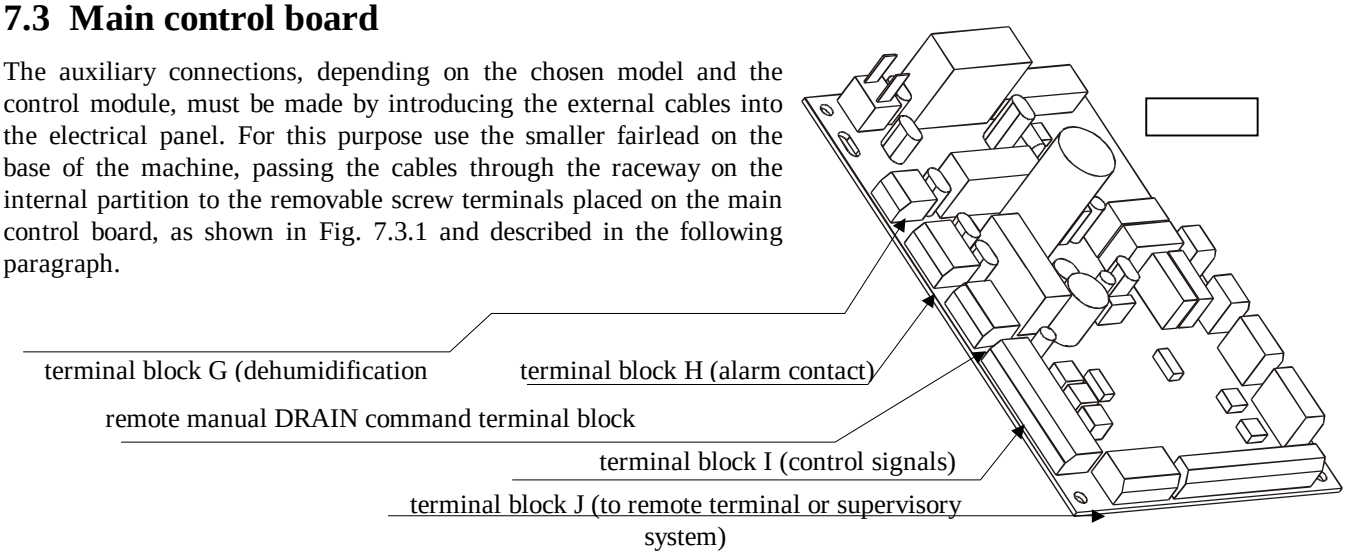


Fig. 7.2.1

The transformer primary is protected by 10.3 x 38mm cylindrical fuses, calibrated as indicated in Table 14.3.6.1.

7.3 Main control board

The auxiliary connections, depending on the chosen model and the control module, must be made by introducing the external cables into the electrical panel. For this purpose use the smaller fairlead on the base of the machine, passing the cables through the raceway on the internal partition to the removable screw terminals placed on the main control board, as shown in Fig. 7.3.1 and described in the following paragraph.


terminal block G (dehumidification
terminal block H (alarm contact)
remote manual DRAIN command terminal block
terminal block I (control signals)
terminal block J (to remote terminal or supervisory system)

7.4 Description of the terminal block and connections (functions and electrical specifications)

Before connecting the probes or the external regulator, set parameters A2 and A6 according to the command signal (see **THE HUMIDIFIER CONTROLLER**)

terminal	function	electrical specifications
1I	supply probe input signal	input impedance: 50 Ω if programmed for 0÷20mA or 4÷20mA 60 kΩ if programmed for 0÷1V or 0÷10V or 2÷10V
2I	GND	
3I	≈ 32Vdc	derived from rectifying of 24Vac; max 250mA
4I	12Vdc stabilised	accuracy ± 5%; Imax=50mA
5I	ambient probe input signal or signal from external regulator	input impedance: 50 Ω if programmed for 0÷20mA or 4÷20mA 60 kΩ if programmed for 0÷1V or 0÷10V or 2÷10V
6I	GND	
7I	remote	Rmax=50 Ω; Vmax=24Vdc; Imax=10mAdc
8I	enabling	
1H	NO alarm contact	250V; 8 A with resistive load; 2A with indicative load
2H	common alarm contact	
3H	NC alarm contact	
1G	NO dehumidification contact	250V; 8 A with resistive load; 2A with indicative load
2G	common dehumidification contact	
1J	≈ 32Vdc	derived from rectifying of 24Vac; max 250mA
2J	L +	standard RS-485
3J	L -	
4J	GND	
1K	remote control terminal block button switch	NC contact
2K	for DRAIN command with simultaneous	common contact
3K	disconnection of the power supply	NO contact

Tab. 7.4.1

7.5 Auxiliary connections

Before making the auxiliary connections, disconnect electrical power to the appliance!

7.5.1 Type C control module with ON/OFF action

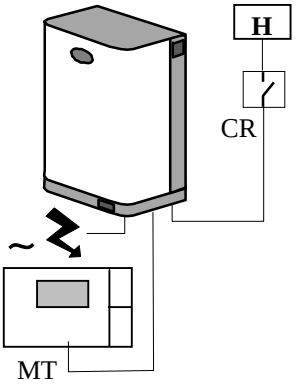


Fig. 7.5.1.1

The humidifier is controlled by a mechanical humidistat H or a voltage-free remote contact CR, or a combination of both.
The control module can be connected to an RS485 serial line, or alternatively to the Carel Humivisor remote control panel, marked as MT, or to a remote supervisor.
The diagrams in Fig. 7.5.1.2 show the connections to be made on the terminal block I, in the following cases:

a) action commanded by simple enabling contact;
b) action from external mechanical humidistat;
c) combination of the above.

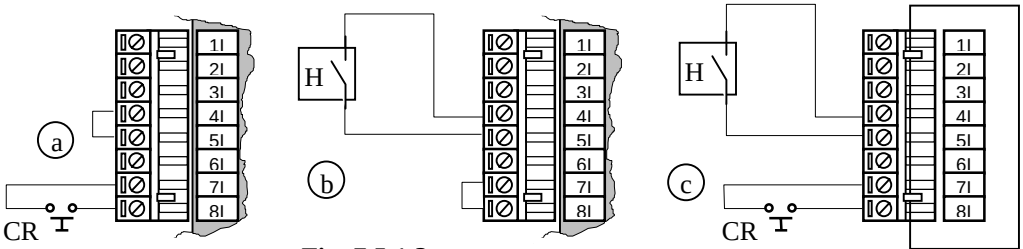
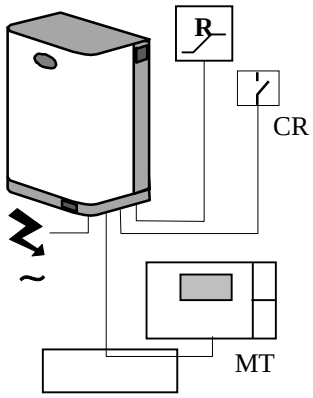


Fig. 7.5.1.2

7.5.2 Type H control module with modulating action

The humidifier with modulating action is fitted with solid-state relays, and thus its capacity can be varied from zero to 100% depending on the regulation requirements. In this case too, the humidifier can be connected via RS485 to the Carel Humivisor MT remote control panel or a remote supervisor. It can be controlled in the following three different modes.

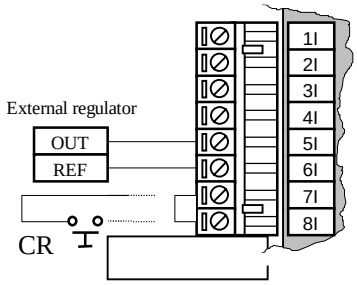
a) Slave regulation, with signal from an external regulator.



Steam production is managed by an external regulator R which transmits a modulating signal to the control module; the control module can be programmed to receive alternatively one of the following modulating signals (see **THE HUMIDIFIER CONTROLLER**):

- voltage signal: 0-1Vdc; 0-10Vdc; 2-10Vdc;
- current signal: 0-20mA; 4-20mA.

The reference (zero) of the external regulator must be connected to terminal 6I on the terminal block I and the command signal to terminal 5I.
To avoid disturbances in regulation, the ground of the external regulator must be connected to the ground of the control.



b) Autonomous modulating regulation with ambient relative humidity probe (and possible limiting probe in the supply duct).

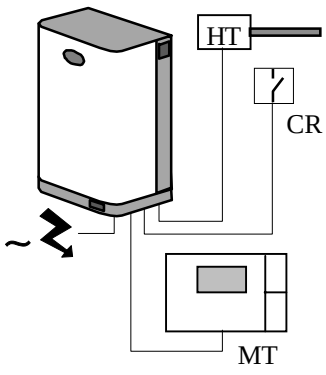
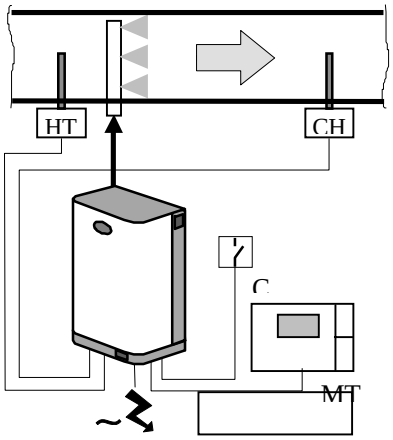
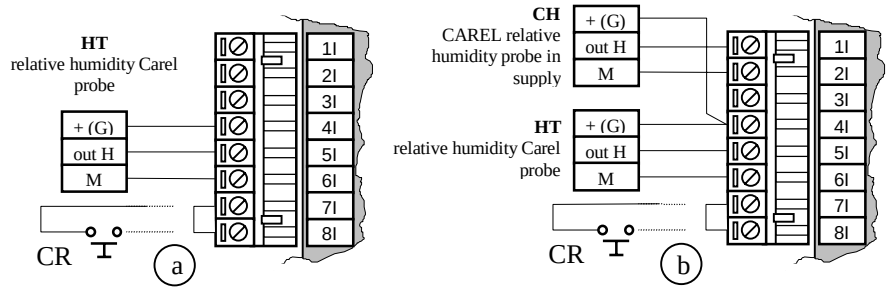


Fig. 7.5.2.3

With this configuration (see Fig. 7.5.2.3) the main control board, connected to a humidity probe HT, performs a complete regulation action according to the humidity measured.
A limiting humidity probe in the supply duct can also be added (see Fig. 7.5.2.4): with this configuration, typical of air handling systems, the main control board, connected to a humidity probe HT, performs a complete regulation action, as well as limiting the steam production depending on the value of relative humidity in the supply duct, measured using the special probe CH.



The diagrams shown in Fig. 7.5.2.5 indicate the connections to be made using Carel probes, for:
a) just one relative humidity probe;
b) a limiting humidity probe in supply duct.



possible Carel probes
ambient
ASWH100000
air ducts
ASDH100000
ASDH200000
special applications
ASPC230000
ASPC110000

Fig. 7.5.2.5

The control can be connected to non-Carel active probes; see **Using different brand probes**.

7.5.3 Control module T for steam baths with modulating action

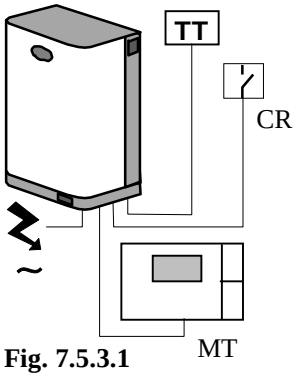


Fig. 7.5.3.1

The control of this appliance features autonomous internal regulation, and is connected to a temperature probe TT.
This performs a complete regulation action according to the temperature measured inside the environment being controlled.
Fig. 7.5.3.2 shows the connection of Carel probe model ASET030001, with a measurement range of -30÷90 °C, or SST00B/P40.
The command signal must be connected to terminal 5I, whose reference (GND) is represented by terminal 6I.

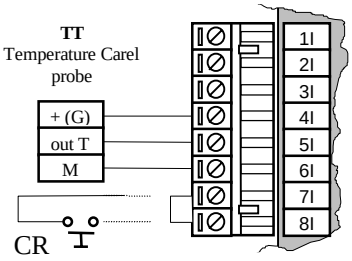


Fig. 7.5.3.2

The control can be connected to non-Carel active probes; see **Using different brand probes**.

7.6 Other auxiliary contacts

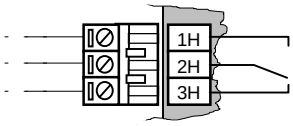


Fig. 7.6.1.1

7.6.1 Alarm contact

The humidifier's control module features a voltage-free switching contact for the remote signalling of the presence of one or more anomalous events or alarms.
Connection to the alarm contact (250Vac; maximum load: 8 A resistive - 2 A inductive) is made using the removable terminal block H, as per Fig. 7.6.1.1.

7.6.2 Dehumidification contact

In the advanced version with internal regulation and humidity transducer, the control module features a voltage-free NO contact, the closing of which can, if required, be programmed to activate an external dehumidification device: in this case the appliance assumes the functions of a complete ambient relative humidity control.
Connection to the dehumidification contact (250Vac; maximum load: 8 A resistive - 2 A inductive) is made using the removable terminal block G, as per Fig. 7.6.2.1.

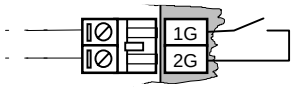


Fig. 7.6.2.1

7.6.3 Remote terminal / supervisory system

The humidifier's control module can be connected to an RS485 serial line, as per the diagram in Fig. 7.6.3.1, or alternatively to:

- a Carel Humivisor remote control panel (see specific instruction manual), which can be connected to four different humidifiers;
- a remote supervisory system.

The transmission line can reach a maximum distance of 1000 metres between the two most distant points.

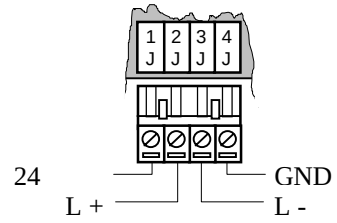


Fig. 7.6.3.1

7.6.4 Using different brand probes

Different brand probes can be used, with output signals selected, by programming the parameter A2, (see **THE HUMIDIFIER CONTROLLER**) from the following:

- voltage signal: 0-1Vdc; 0-10Vdc; 2-10Vdc.
- current signal: 0-20mA; 4-20mA.

In addition, the maximum and minimum values must be programmed for the signal (parameters A3 and A4 for the ambient probe; A7 and A8 for the supply probe).

The probes can be powered at the following voltages:

- 12V stabilised at terminal 4I;
- 32Vdc from the rectifying of 24Vac at terminal 3I.

The command signals must be connected:

- for the regulation probe HT (that is TT in the case of controls for Steam baths) to terminal 5I, whose reference ground (GND) is terminal 6I;
- for the limiting probe CH, to terminal 1I, whose reference ground (GND) is terminal 2I.

IMPORTANT WARNINGS:

1. **To avoid disturbances to regulation, the ground of the probes or the external regulators must be electrically connected to the ground of the appliance's control.**

2. **For humidifier operation terminals 7I and 8I must be connected by an enabling contact or a jumper (default solution). If terminals 7I and 8I are not connected, all internal and external devices commanded by the control are disabled.**

7.7 Checks

The following conditions represent correct electrical connection:

- the rated voltage of the appliance corresponds to the voltage on the specification plate;
- the fuses installed are suitable for the line and the voltage of the power supply ;
- a line cut-off switch has been installed to enable power to the humidifier to be disconnected;
- the electrical connections have been made as per the diagrams;
- the power cable is fastened to the tear-proof cable clamp;
- terminals 7I and 8I are connected by jumper or an enabling contact;
- the ground of any non-Carel probes is electrically connected to the ground of the control;
- if the appliance is commanded by an external regulator, the ground of the signal is electrically connected to the ground of the control.

7.8 Wiring diagrams for the connection of the elements at the headers

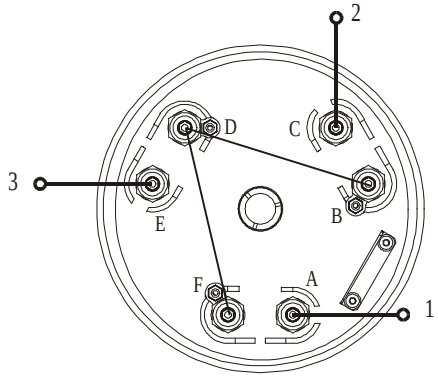


Fig. 7.8.1

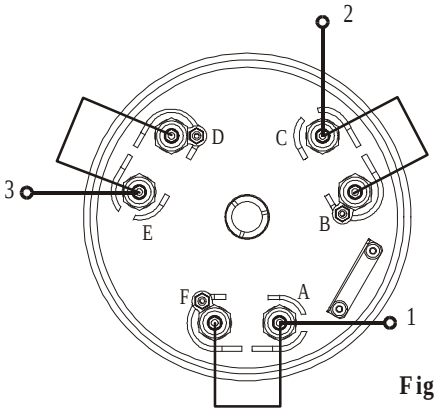
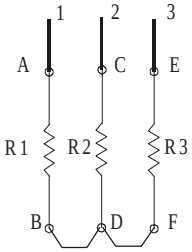
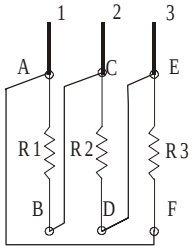


Fig. 7.8.2





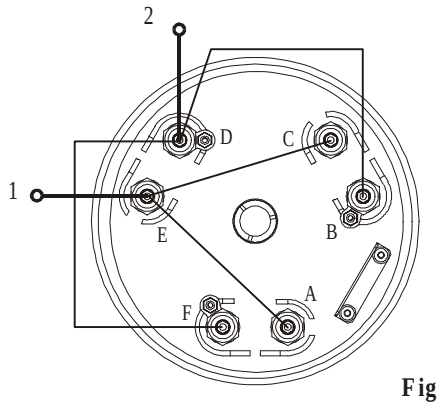


Fig. 7.8.3

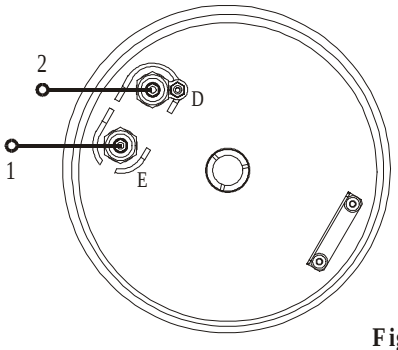
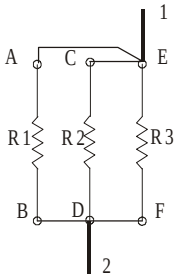
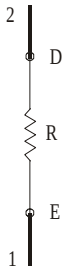


Fig. 7.8.4





1-2-3	three-phase power supply terminals
Fig. 7.8.1	three-phase star connection
Fig. 7.8.2	three-phase delta connection

1-2	single-phase power supply terminals
Fig. 7.8.3	single-phase parallel connection (6kg/h)
Fig. 7.8.4	single-phase connection (2-4kg/h)

Tab. 7.8.1

7.9 Single-phase wiring diagram for 2-4kg/h humidifiers with type C control module

WARNING:
EXTERNAL SIGNAL
see Figs.: 7.5.1.2 / .2.2 / .2.5 / .3.2

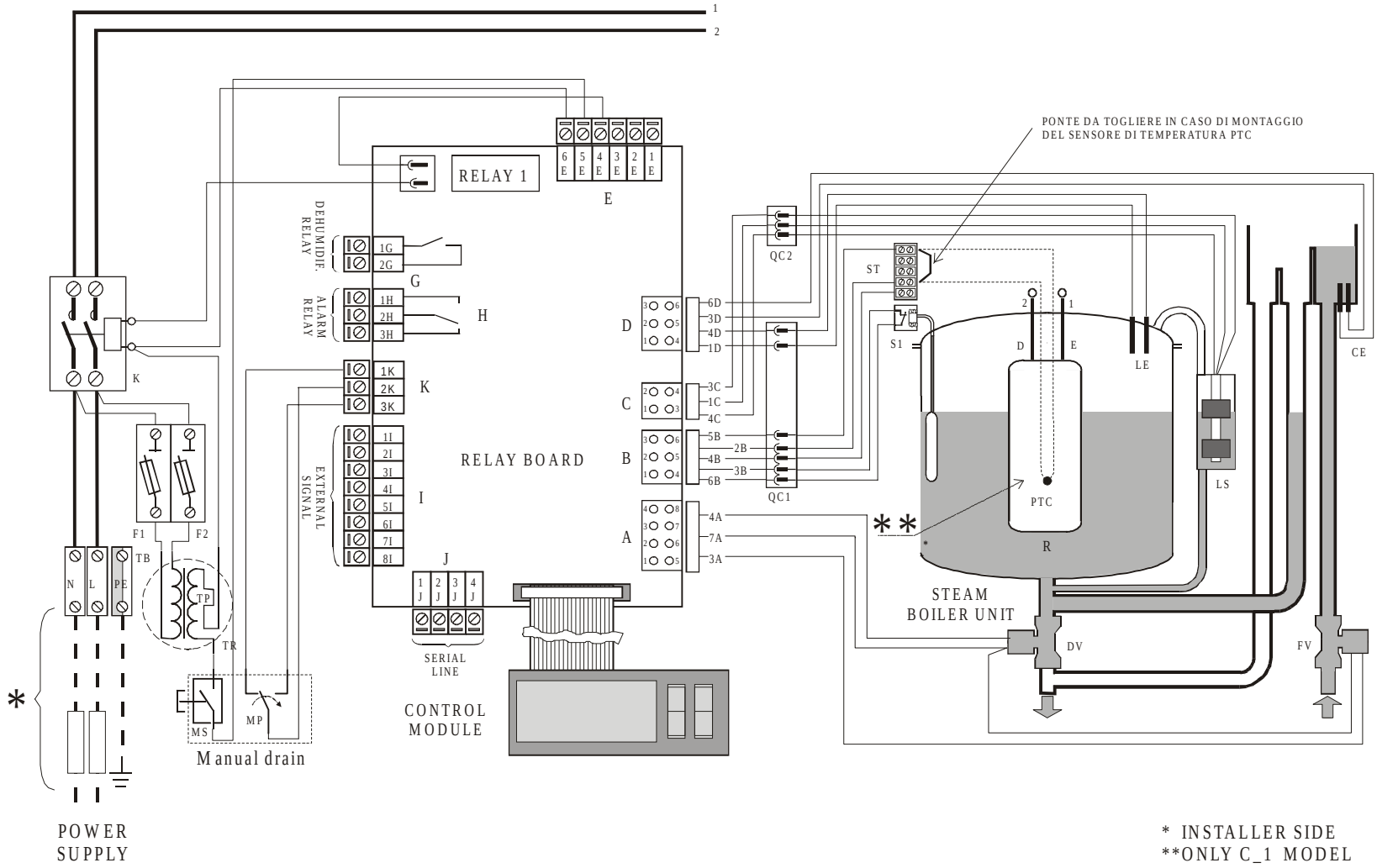


Fig. 7.9.1

Carried out by the installer

TB	Terminal block	**S1**	Safety thermostat	**R**	Electrical heating element
K	Contactor	**LS**	Level switches	**QC1-QC2**	Quick connectors
F1-F2	Auxiliary fuses	**FV**	Fill valve	**ST**	Sensor terminal block
TR	Toroidal transformer	**DV**	Drain valve	**PTC (1)**	Element temperature sensor
TP	Circuit breaker	**LE**	High level electrodes	**13-14**	Auxiliary contacts contactor K
MS	Manual switch	**CE**	Conductivity meter electrodes		

(1) optional in the version C0, standard in the version C1

7.10 Single-phase wiring diagram for 2-4kg/h humidifiers with type H or T control module

WARNING:
EXTERNAL SIGNAL
see Figs.: 7.5.1.2 / .2.2 / .2.5 / .3.2

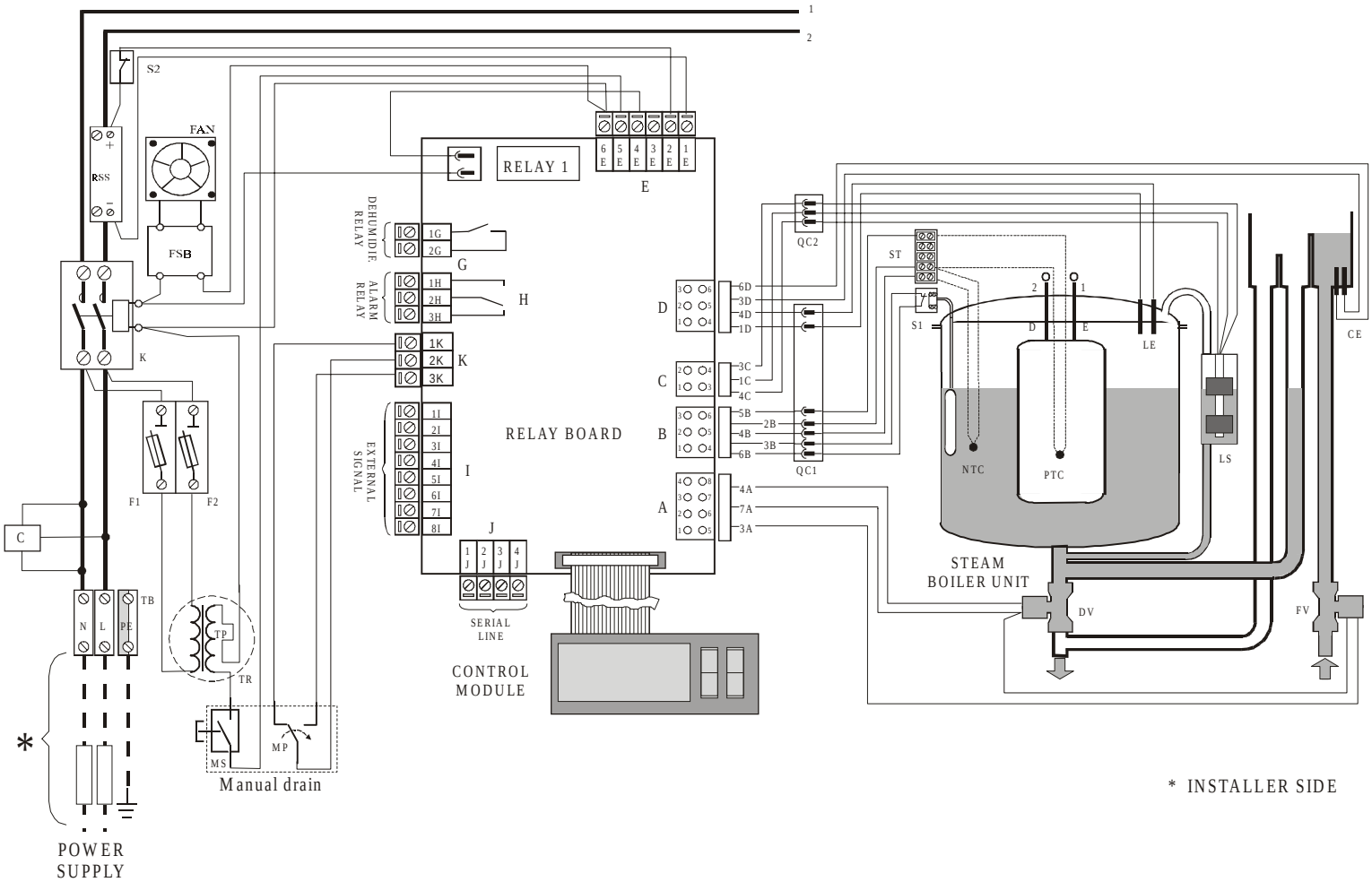


Fig. 7.10.1

Carried out by the installer

TB	Terminal block	**FV**	Fill valve	**PTC (1)**	Element temperature sensor
K	Contactor	**DV**	Drain valve	**NTC (1)**	Water temperature sensor
F1-F2	Auxiliary fuses	**LE**	High level electrodes	**13-14**	Auxiliary contacts contactor K
TR	Toroidal transformer	**CE**	Conductivity meter electrodes	**FAN (1)**	Fan
TP	Circuit breaker	**C**	Filter	**FSB (1)**	Fan control board
MS	Manual switch	**R**	Electrical heating element	**SSR (1)**	Solid state relay
S1	Safety thermostat	**QC1-QC2**	Quick connectors	**S2 (1)**	Circuit breaker
LS	Level switches	**ST**	Sensor terminal block		

(1) optional in the versions H0 and T0, standard in the versions H1 and T1

7.11 Single-phase wiring diagram for 6kg/h humidifiers with type C control module

WARNINGS:

1. **EXTERNAL SIGNAL**
see Figs.: 7.5.1.2 / .2.2 / .2.5 / .3.2
2. **BRIDGING CONNECTION**
see Fig.7.8.3

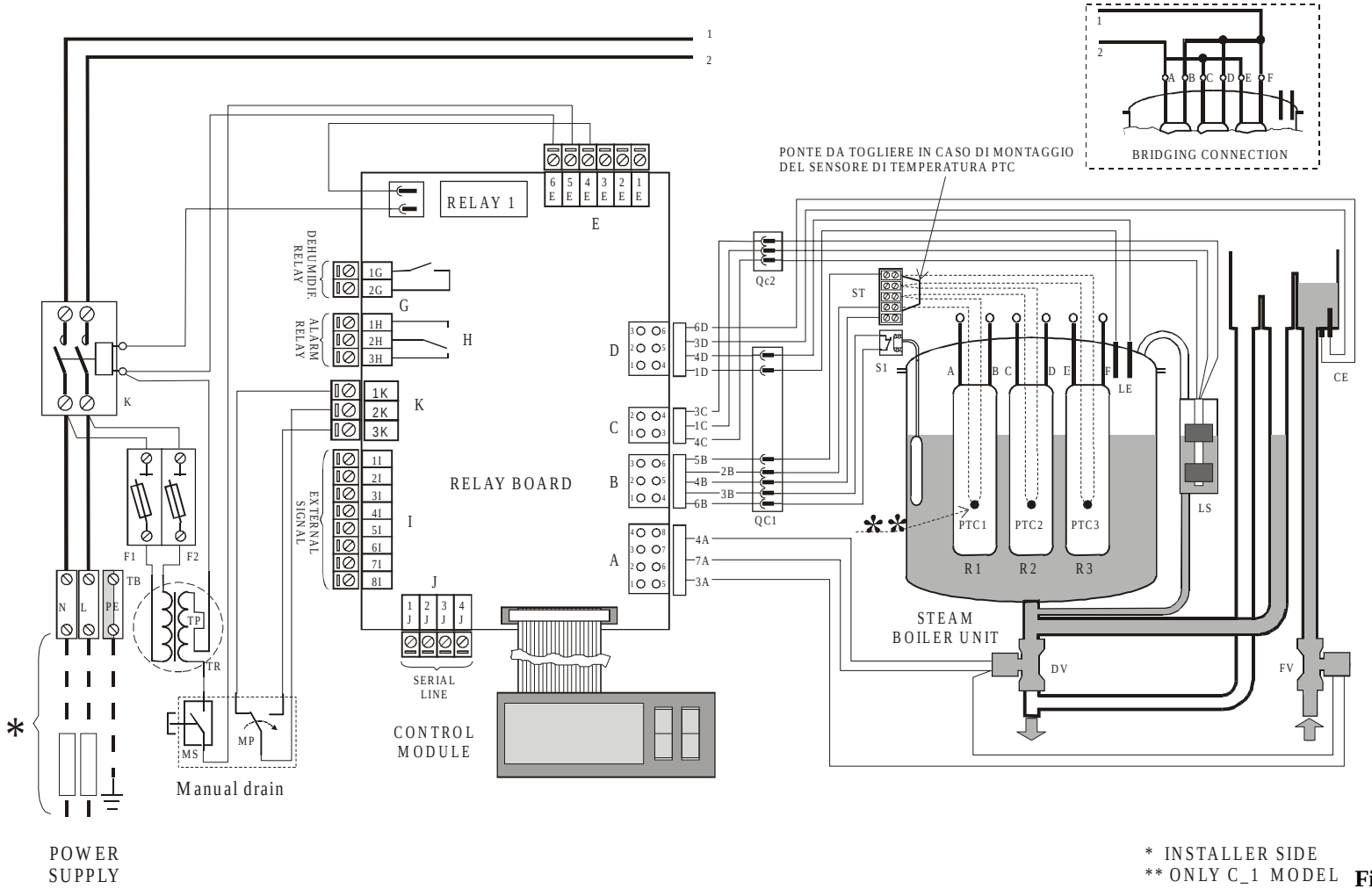


Fig. 7.11.1

Carried out by the installer

TB	Terminal block	**S1**	Safety thermostat	**R1-R2-R3**	Electrical elements
K	Contactor	**LS**	Level switches	**QC1-QC2**	Quick connectors
F1-F2	Auxiliary fuses	**FV**	Fill valve	**ST**	Sensor terminal block
TR	Toroidal transformer	**DV**	Drain valve	**PTC1- PTC2- PTC3 (1)**	Element temperature sensors
TP	Circuit breaker	**LE**	High level electrodes	**13-14**	Auxiliary contacts contactor K
MS	Manual switch	**CE**	Conductivity meter electrodes		

(1) optional in the version C0, standard in the version C1

7.12 Single-phase wiring diagram for 6kg/h humidifiers with type H or T control module

WARNINGS:

1. **EXTERNAL SIGNAL**
see Figs.: 7.5.1.2 / .2.2 / .2.5 / .3.2
2. **BRIDGING CONNECTION**
see Fig.7.8.3

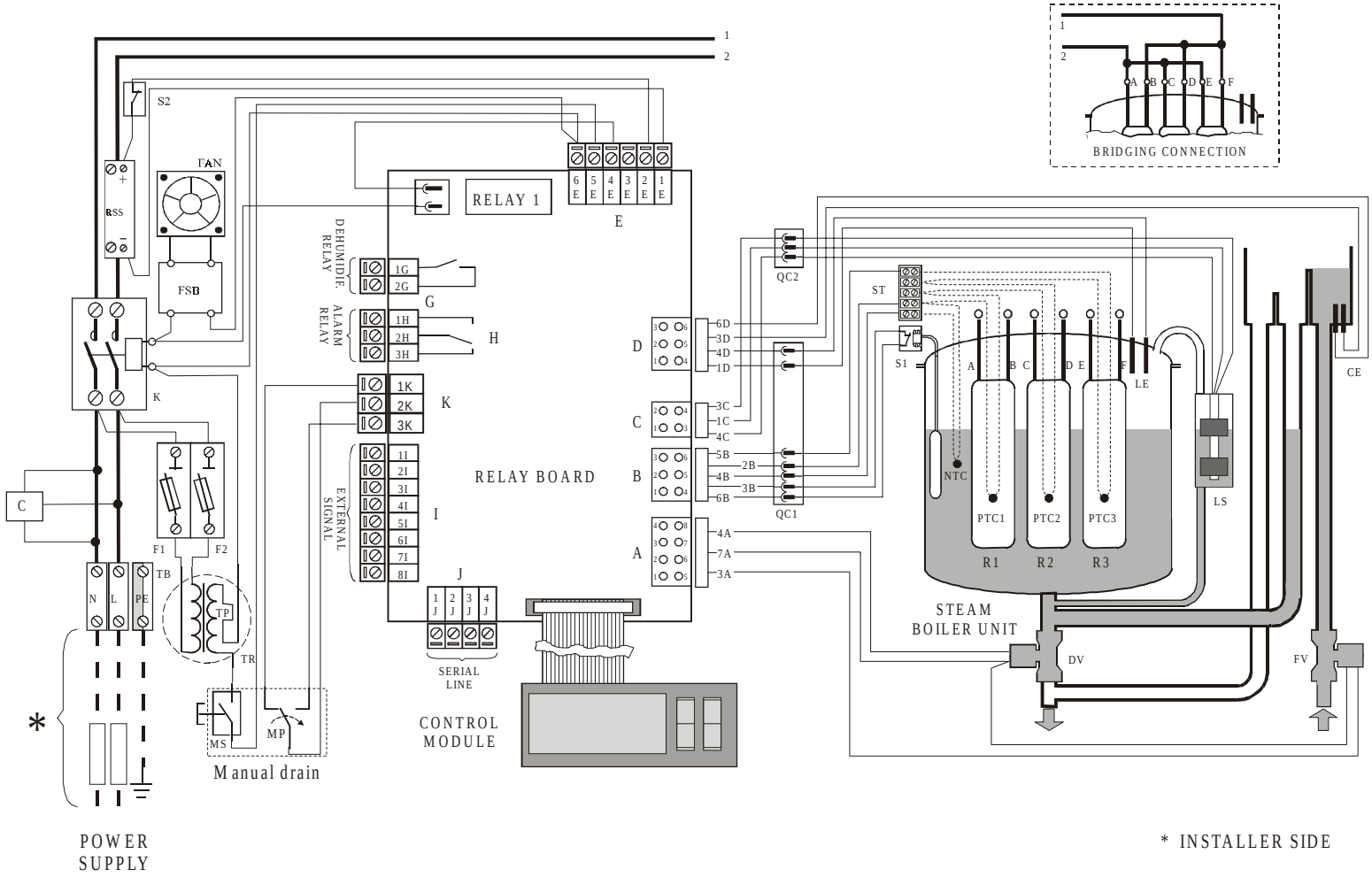


Fig. 7.12.1

Carried out by the installer

TB	Terminal block	**FV**	Fill valve	**PTC1-PTC2-PTC3 (1)**	Element temperature sensors
K	Contactor	**DV**	Drain valve	**NTC (1)**	Water temperature sensor
F1-F2	Auxiliary fuses	**LE**	High level electrodes	**13-14**	Auxiliary contacts contactor K
TR	Toroidal transformer	**CE**	Conductivity meter electrodes	**FAN (1)**	Fan
TP	Circuit breaker	**C**	Filter	**FSB (1)**	Fan control board
MS	Manual switch	**R1-R2-R3**	Electrical elements	**SSR (1)**	Solid state relay
S1	Safety thermostat	**QC1-QC2**	Quick connectors	**S2 (1)**	Circuit breaker
LS	Level switches	**ST**	Sensor terminal block		

(1) optional in the versions H0 and T0, standard in the versions H1 and T1

7.13 Three-phase wiring diagram for humidifiers with type C control module

WARNINGS:

1. **EXTERNAL SIGNAL**
see Figs.: 7.5.1.2 / .2.2 / .2.5 / .3.2
2. **BRIDGING CONNECTION**
see Fig.7.8.3

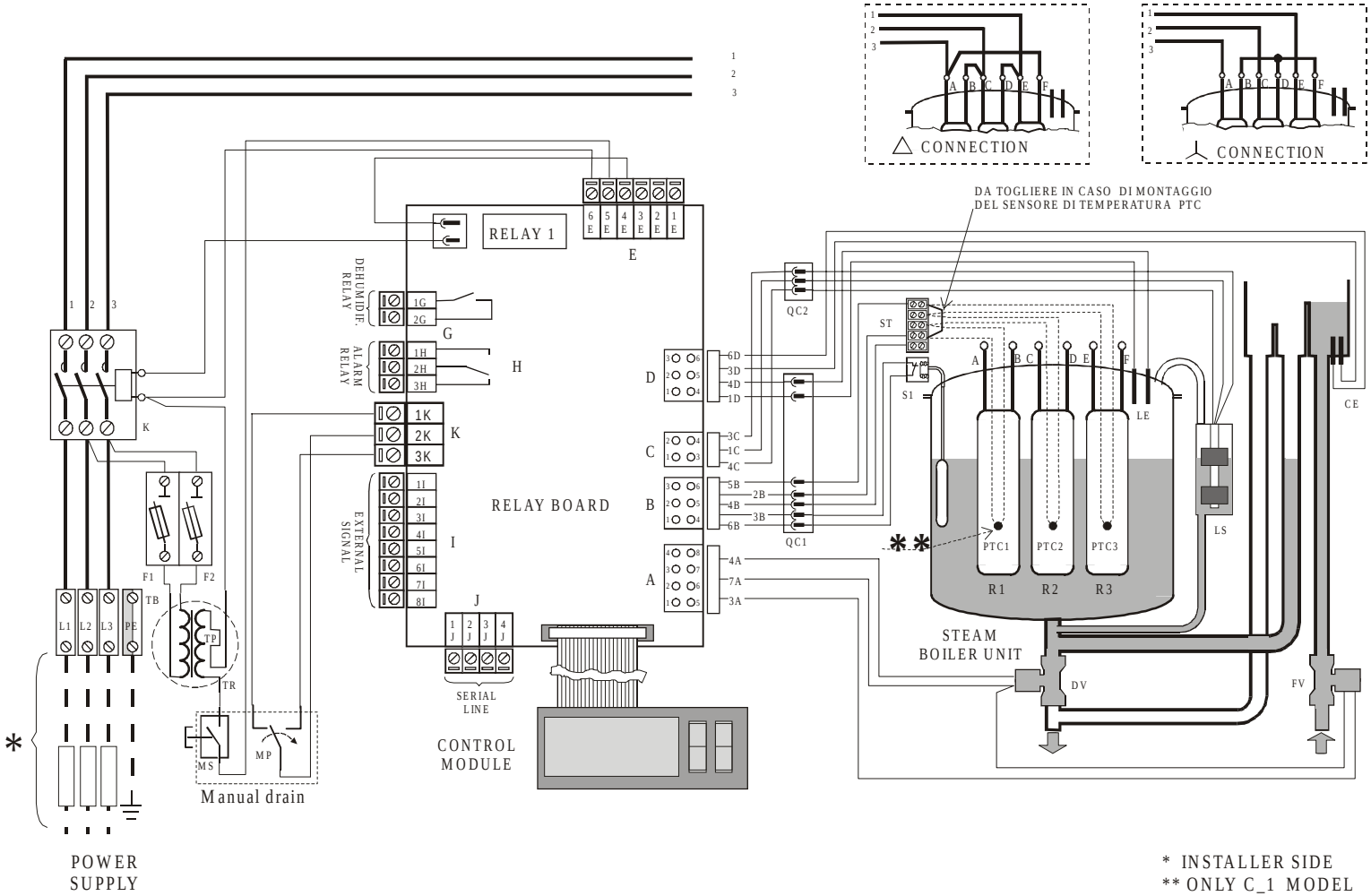


Fig. 7.13.1

Carried out by the installer

TB	Terminal block	**S1**	Safety thermostat	**R1-R2-R3**	Electrical elements
K	Contactor	**LS**	Level switches	**QC1-QC2**	Quick connectors
F1-F2	Auxiliary fuses	**FV**	Fill valve	**ST**	Sensor terminal block
TR	Toroidal transformer	**DV**	Drain valve	**PTC1-PTC2-PTC3 (1)**	Element temperature sensors
TP	Circuit breaker	**LE**	High level electrodes	**NTC (1)**	Water temperature sensor
MS	Manual switch	**CE**	Conductivity meter electrodes	**13-14**	Auxiliary contacts contactor K

(1) optional in the version C0, standard in the version C1

7.14 Three-phase wiring diagram for humidifiers with type H or T control module

WARNINGS:

1. **EXTERNAL SIGNAL**
see Figs.: 7.5.1.2 / .2.2 / .2.5 / .3.2
2. **BRIDGING CONNECTION**
see Fig.7.8.3

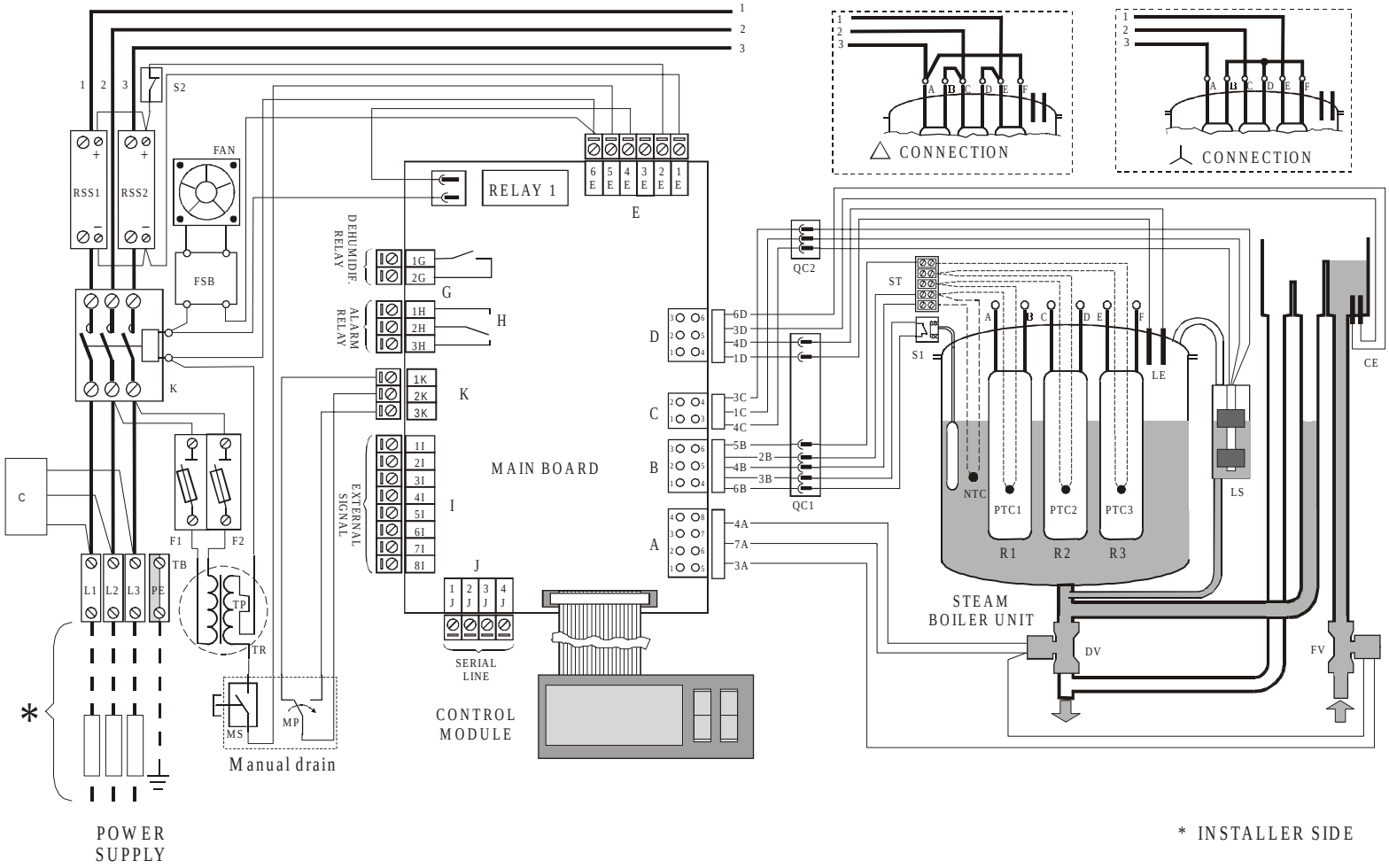


Fig. 7.14.1

Carried out by the installer

TB	Terminal block	**FV**	Fill valve	**PTC1-PTC2-PTC3 (1)**	Element temperature sensors
K	Contactor	**DV**	Drain valve	**NTC (1)**	Water temperature sensor
F1-F2	Auxiliary fuses	**LE**	High level electrodes	**13-14**	Auxiliary contacts contactor K
TR	Toroidal transformer	**CE**	Conductivity meter electrodes	**FAN (1)**	Fan
TP	Circuit breaker	**C**	Filter	**FSB (1)**	Fan control board
MS	Manual switch	**R1-R2-R3**	Electrical elements	**SSR (1)**	Solid state relay
S1	Safety thermostat	**QC1-QC2**	Quick connectors	**S2 (1)**	Circuit breaker
LS	Level switches	**ST**	Sensor terminal block		

(1) optional in the versions H0 and T0, standard in the versions H1 and T1

8. Steam distribution

For optimal performance of the humidifier, the steam produced must be introduced into the environment in a uniform way, without projecting droplets and without noticeable condensation, using ventilated steam distributors or linear distributors. The steam distributor must be chosen according to the place where the steam is introduced. If the steam is to be distributed directly into the environment (rooms, warehouses, etc.), the ventilated steam distributors used (optional) should be fitted with a motorised fan. If, on the other hand, the steam is to be introduced into a duct or air handling system, linear distributors must be used, which exploit the speed of the air itself for distribution.

8.1 Ambient steam distribution: ventilated steam distributors

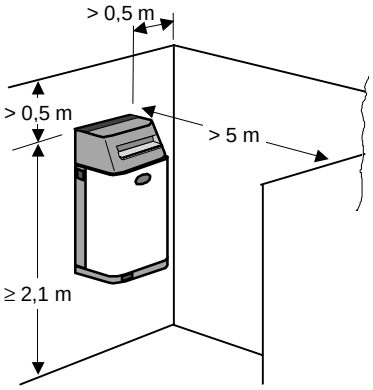


Fig. 8.1.1

Ventilated steam distributors, used to distribute steam directly into the environment, can be mounted onto the humidifier (see Fig. 8.1.1) or positioned separately and connected to the humidifier (see Fig. 8.1.2) using steam conveyance tubing.
The drawings show the minimum recommended distances to prevent the flow of humidified air from coming into direct contact with persons, lights, electrical appliances, false ceilings and cold surfaces before the steam is completely absorbed by the environment. For further details on the mounting and use of ventilated steam distributors, please refer to the specific instruction manual.

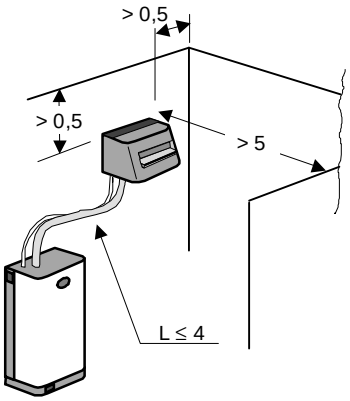


Fig. 8.1.2

8.2 Steam distribution in cold rooms

It is possible to humidify a cold room using a ventilated steam distributor, ensuring that this works within the limits of its operating range. The cold room must have an operating temperature between -10°C and +20°C, with a relative humidity of not over 80% rH. If these limits are not possible, the steam can be distributed in the cold room using a linear distributor.
In any case, the steam must not come into direct contact with cold air streams from the cold room's refrigeration unit, to avoid possible re-condensation.

8.3 Ducted steam distribution: linear and concentrated jet distributors (OEM)

For steam distribution in air ducts, the steam distributor must be suitably proportioned to the power of the humidifier and the cross-section of the ducts. For this purpose, Carel supplies two ranges of linear distributors: one in aluminium, with plastic ends (type E) and a premium range, made completely from AISI 304 stainless steel with double chamber (type L).
Figures 8.3.1 and 8.3.2 provide the dimensions of Carel distributors.
Table 8.3.1 indicates the minimum number and model of the distributors recommended for the type of humidifier used.

		models			
distributor code	**rated length**	**UR002**	**UR004**	**UR006**	**UR010**
SDP45E (aluminium)	450mm	1	1	1	1
SDP65E (aluminium)	650mm	1	1	1	1
SDP85E (aluminium)	850mm	-	1	1	1
SDP120E (aluminium)	1200mm	-	-	1	1
SDP05L (stainless steel)	450mm	1	1	1	-
SDP06L (stainless steel)	550mm	1	1	1	-
SDP08L (stainless steel)	750mm	1	1	1	1
SDP10L (stainless steel)	950mm	-	1	1	1
SDP12L (stainless steel)	1150mm	-	-	1	1
SDP16L (stainless steel)	1600mm	-	-	-	1
SDP20L (stainless steel)	2000mm	-	-	-	1

Tab. 8.3.1

SDPE - Aluminium and plastic distributors**

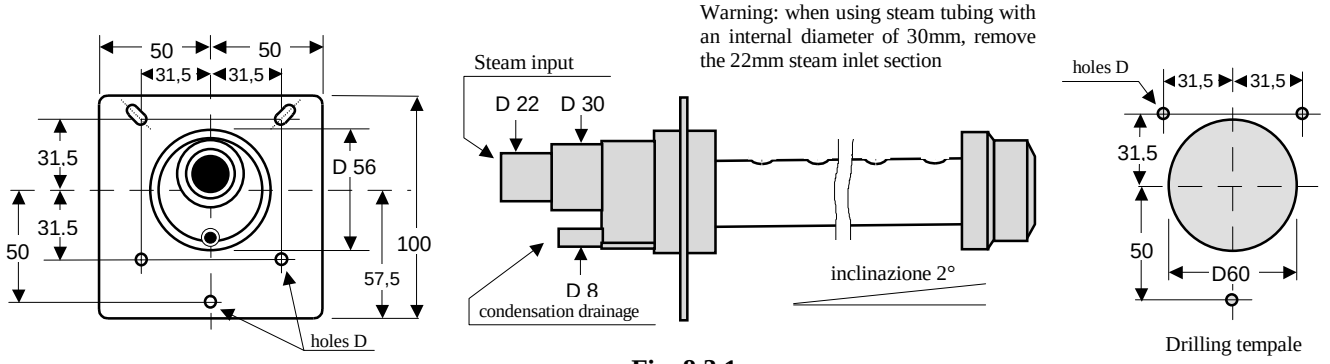


Fig. 8.3.1

SDPS / SDP**L - Stainless steel distributors**

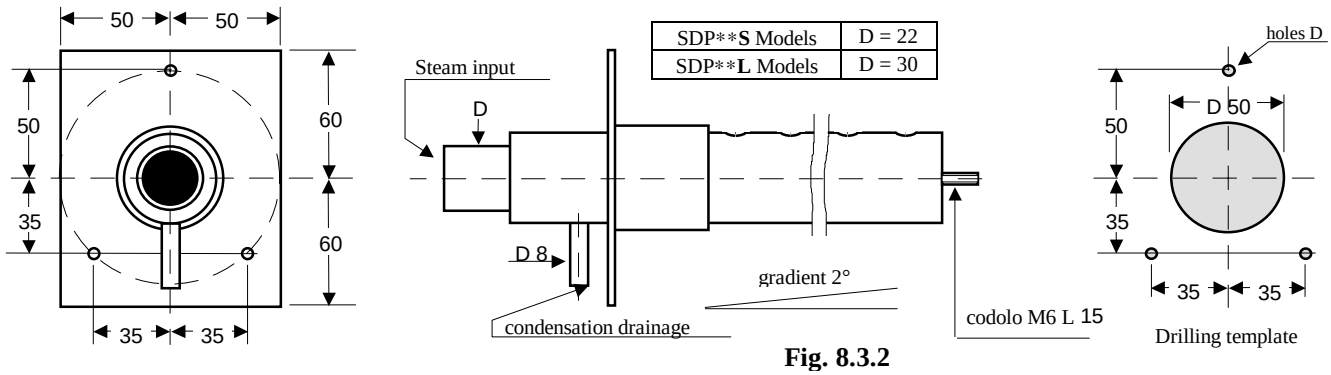


Fig. 8.3.2

The linear distributors are mounted (see Fig. 8.3.3):

- by making a series of holes in the wall of the duct, as per the drilling template indicated in Figs.: 8.3.1 or 8.3.2;
- inserting the distributor with the steam outlet holes facing upwards;
- fastening the flange of the distributor using 3 screws.

To allow the condensation to return through the drain connection (see **Installing the condensation return tubing**), mount the distributor at a slight angle (at least 2°-3°) with the inlet connection nearer than the closed end, which, for this reason, must be adequately supported.

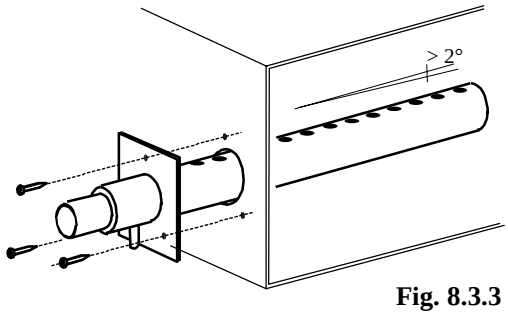


Fig. 8.3.3

8.4 Concentrated jet steam distribution (OEM)

For special applications (e.g. steam baths, technological machinery) a plastic OEM concentrated jet distributor is available, with holes (12 or 22mm) or without, allowing the user to make these according to requirements (see Fig. 8.4.1).
The OEM distributors can be fitted, horizontally or vertically with the hole facing upwards, onto a support with the same holes as per the drilling template for the aluminium linear distributor (see Fig. 8.3.1).

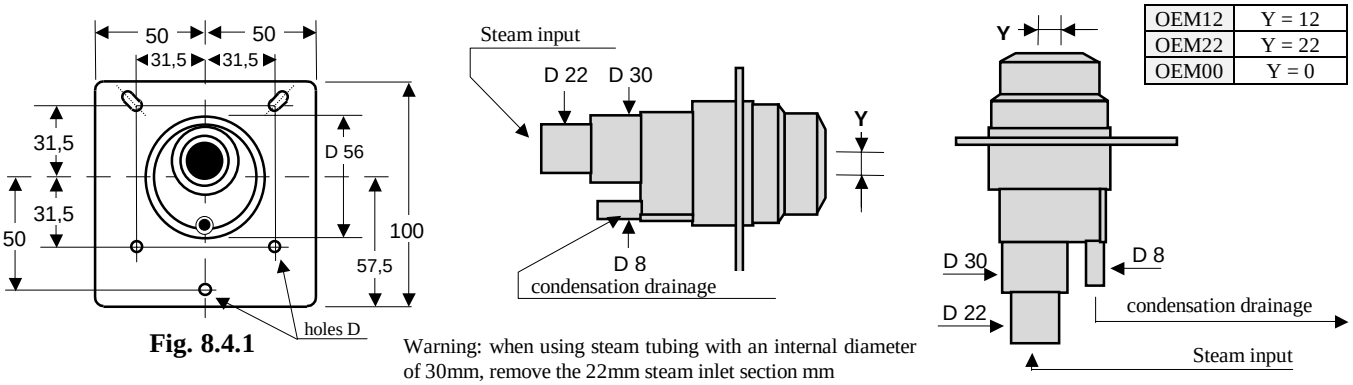


Fig. 8.4.1

Warning: when using steam tubing with an internal diameter of 30mm, remove the 22mm steam inlet section mm

8.5 Positioning linear distributors in the air duct

Depending on the dimensions of the air duct, the distributors must be as long as possible and placed away from curves, branches, changes in cross-section, grids, filters, fans.
The minimum recommended distance between the steam distributor and the nearest obstacle is around 1÷1.5 metres, yet this strongly depends on the operating conditions; it in fact increases as a result of:

- the increase in speed of the air in the duct;
- the increase in relative humidity of the air before and, above all, after humidification;
- the decrease in turbulence.

The distance can be shortened using a series of distributors in parallel.

Refer to the layout and the distances between the distributor and the walls of the duct and/or between two distributors as shown in the following drawings.

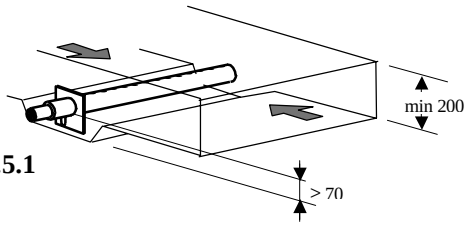


Fig. 8.5.1

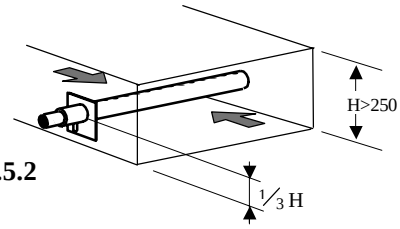


Fig. 8.5.2

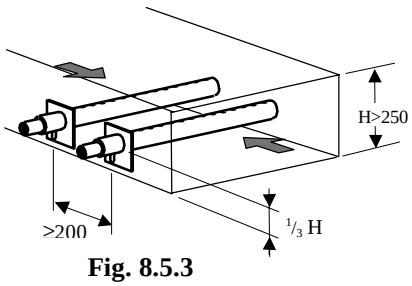


Fig. 8.5.3

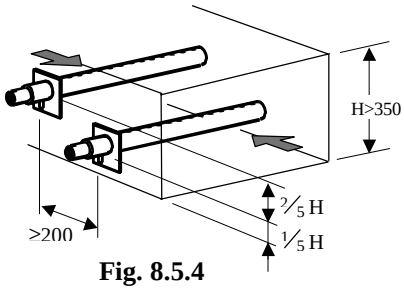


Fig. 8.5.4

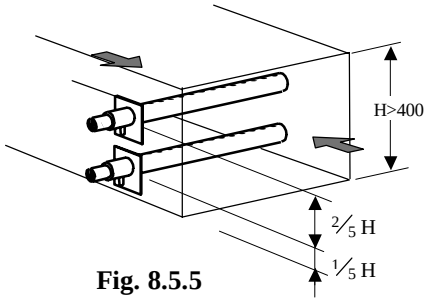


Fig. 8.5.5

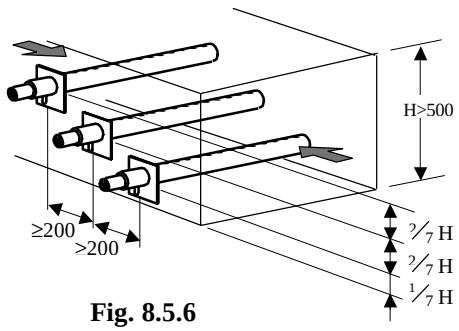


Fig. 8.5.6

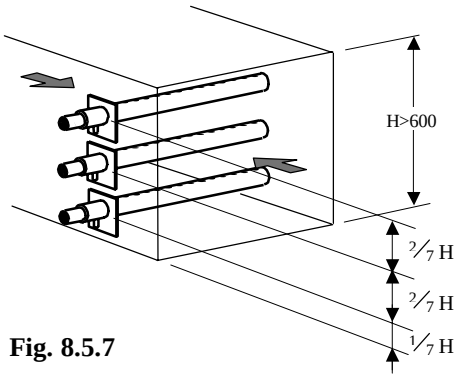


Fig. 8.5.7

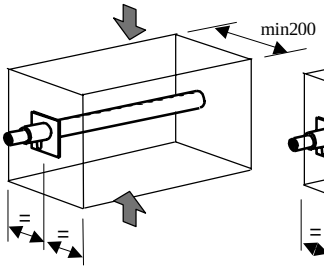


Fig. 8.5.8

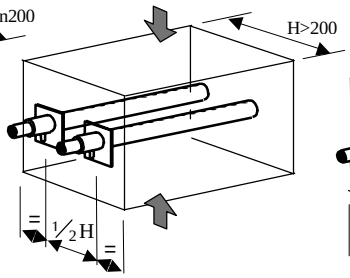


Fig. 8.5.9

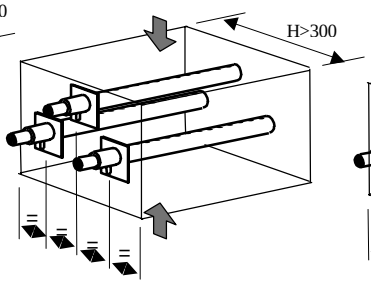


Fig. 8.5.10

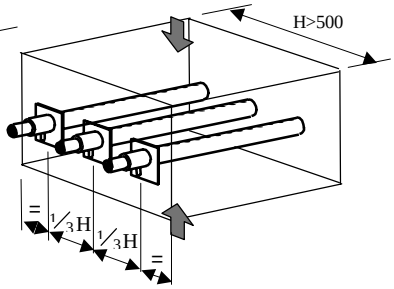


Fig. 8.5.11

8.6 Installation of the steam conveyance tubing

The connection between the humidifier and distributor must be made using suitable tubing, such as the Carel flexible tubing. The use of incorrect tubing may lead to fragility and cracks and consequent steam leaks.

The shape of the tubing must be such as to avoid the accumulation of condensation and consequent noise (in the form of gurgling) and loss of efficiency; the course of the tubing must exploit gravity to drain the re-condensed steam back to the boiler or the distributor.

Avoid the formation of pockets or traps where condensation may form; furthermore, ensure that the tubing is not choked due to tight bends or twisting (see Fig. 8.6.1).

Fasten the ends of the tubing to the connections on the humidifier and the steam distributor using screw clamps, so that they do not come loose as a result of the temperature.

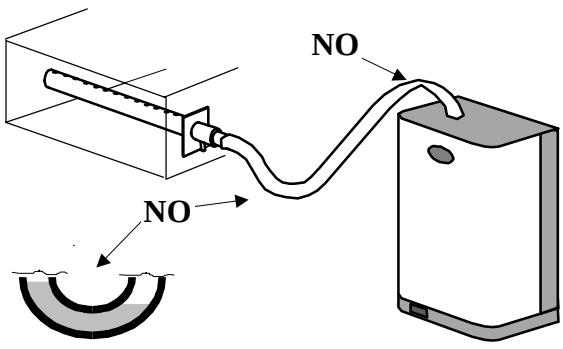


Fig. 8.6.1

Depending on the position of the steam distributor, the course of the tubing may be one of the following:
1. upwards with a vertical section at least 300mm in length, followed by a bend with a minimum radius of 300mm, and finally a downward section with a constant slope of not less than 5° (see Fig. 8.6.2);
2. for very short courses (less than 2 metres), a bend with a minimum radius of 300mm followed by from an upward section with a slope of not less than 20° (see Fig. 8.6.3).

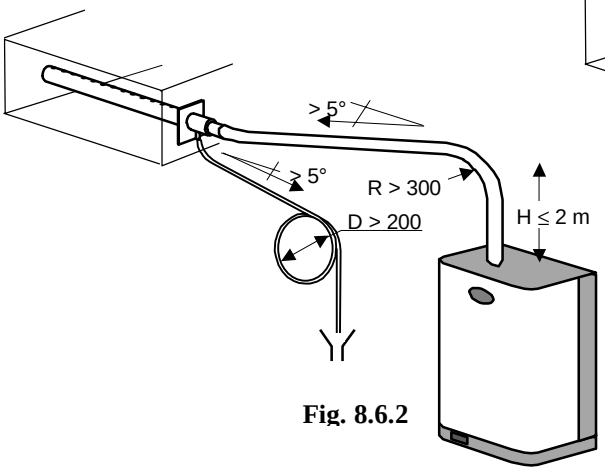


Fig. 8.6.2

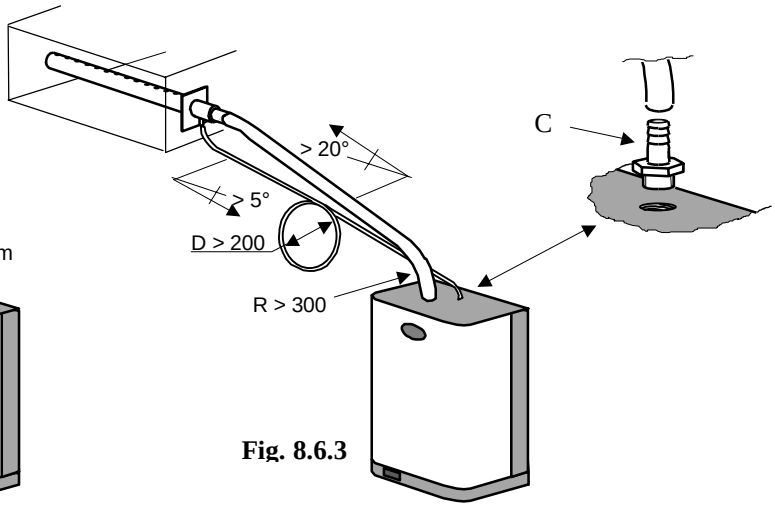


Fig. 8.6.3

IMPORTANT WARNING: the recommended length of the steam conveyance tubing is less than 4m.

8.7 Installing the condensation return tubing

Due to the re-condensation of part of the steam produced, condensation forms in the steam conveyance tubing and inside the distributor which must be drained to avoid gurgling and loss of efficiency.
The condensation is drained by the effect of gravity with the help of flexible tubing suitable for this purpose. The use of incorrect tubing can lead to fragility and cracks and consequent steam leaks.
To avoid the non-condensed steam from being released through the condensation tubing, a trap must be created by curling a part of the drain tubing.
The end of the condensation tubing can be connected to the nearest drain tube, with a minimum slope of 5° to assist the discharge (see Fig. 8.6.2).
If the distance of the distributor allows, the tubing can be connected to the special connection C, supplied, to be screwed onto the top of the humidifier, allowing condensation to be drained directly into the boiler fill tank (see Fig. 8.6.3).

IMPORTANT WARNING: for correct functioning, the trap must be filled with water before starting the humidifier.

8.8 Checks

The following conditions represent the correct installation of the steam tubing:
- the position of the steam distributor conforms to that described in this chapter, the steam outlet tubing points upwards and the distributor is inclined at least 2° upwards;
- the ends of the tubing are fastened with metal screw clamps;
- the bends in the tubing are quite wide (radius > 300mm) so as not to cause pinching or choking;
- there are no pockets or traps in the steam tubing to avoid condensation;
- the courses of the steam tubing and the condensation tubing conform to those described in this chapter;
- the length of the steam tubing does not exceed 4 metres;
- the slope of the steam tubing is sufficient to drag the condensation (> 20° for the upward sections, > 5° for the downward sections);
- the slope of the condensation tubing is at least 5° at each point;
- the condensation tubing features a trap (filled with water before start-up) to avoid the release of steam.

9. START-UP

IMPORTANT WARNING: on completion of the installation procedure, drain the supply tubing for around 30 minutes by passing water directly through the tubing and without introducing it into the humidifier. This will allow the elimination of any scoria and processing residues which may cause the formation of foam during the boiling.

9.1 Preliminary checks

Before starting the humidifier, check that:

- the hydraulic and electrical connections are made and the steam distribution system is configured according to the instructions contained herein;
- the shut-off tap for water into the humidifier is open;
- the power fuses are installed and in tact;
- terminals 7I and 8I are connected by jumper or connected to the remote ON/OFF contact, and that the latter is closed;
- the probes or the external command device are correctly connected (and that the ground of these devices is electrically connected to the ground of the main control board);
- the steam emission tubing is not choked;
- in the event of ducted humidification, the operation of the humidifier is slave to the operation of the air fan (replacing or in series with the remote ON/OFF contact);
- the distributor condensation return tubing is installed and free;
- the drain tubing is correctly connected and free.

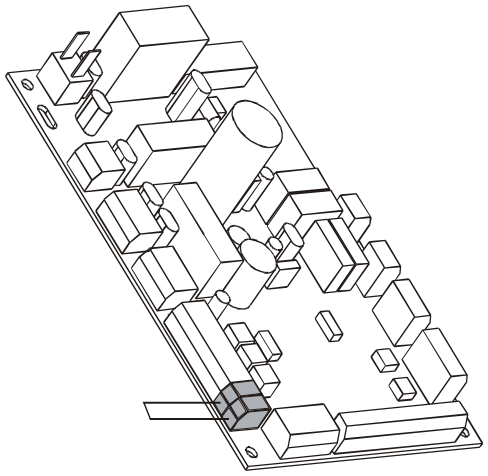


Fig. 9.1.1

Prima dell'avviamento verificare che l'umidificatore sia in perfette condizioni, che non vi siano perdite d'acqua e che le parti elettriche siano asciutte.
Non applicare la tensione se l'apparecchio è danneggiato o anche parzialmente bagnato!

9.2 Removing the element centring spring (only for three-phase models)

To prevent the elements in three-phase models hitting each other or against the internal wall of the cylinder and thus damaging the appliance, due to vibrations or bumps during transport, the heating elements are factory-fitted with a centring spring which has no function during the operation of the appliance.

As the centring spring may hinder the removal of lime-scale from the elements and diminish the interval between cleaning cycles, **the spring should be removed before the initial start-up**.
To do this, remove the cylinder by following the relative instructions (see **Maintenance of the cylinder-boiler)**.

9.3 Start-up

After having closed the power switch to the humidifier, turn the appliance on by moving the rocker switch (coupled with the DRAIN button) located in the bottom right of the frame, to the I position.
The start-up sequence is thus initiated. This includes the initial phase, the autotest phase, and finally, the actual operating phase.
According to the model of the humidifier's control module, the start-up sequence is signalled by the illumination of the LEDs on the control panel, as described in the following chapter.

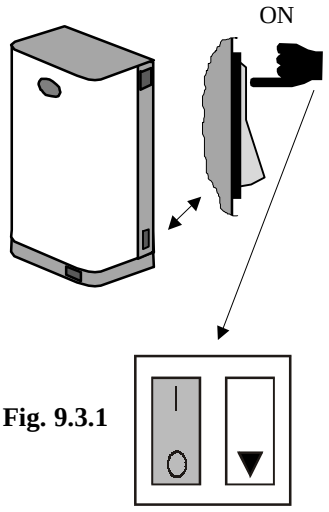


Fig. 9.3.1

10. THE HUMIDIFIER CONTROLLER

Two types of electronic controller are available for the electrical heater humidifier (see **REGULATION PRINCIPLES**):

- **Type C control module, with indication LEDs and ON/OFF action**
  This control provides regulation of the steam production capacity and ON/OFF regulation.
- **Type H or T control module, with numeric LED display and modulating action**
  This control provides complete regulation of the steam production capacity, with optional dehumidification function; it accepts signals from humidity probes or from proportional (or ON/OFF) external electronic devices.

10.1 Type C control module, with indication LEDs and ON/OFF action

10.1.1 Front panel

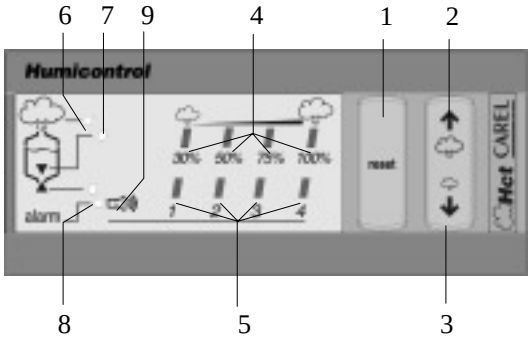


Fig. 10.1.1.1

n.	description
1	reset button for the alarm relay (if the alarm is no longer active)
2	increase programmed steam production button
3	decrease programmed steam production button
4	set steam production bar graph (percentage)
5	bar graph indicating any active alarms
6	LED indicating current steam production
7	LED indicating operation of drain electrovalve
8	LED indicating operation of the fill electrovalve
9	flashing LED indicating alarm relay activated

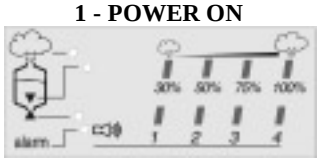
Tab. 10.1.1.1

The ON/OFF version allows the display and modification only of the steam production parameter.
The other functional parameters are factory set and can not be modified by the user (they can however be accessed via serial line).

10.1.2 Start-up sequence

On starting-up the humidifier, the start-up sequence occurs, signalled by the illumination of the LEDs, as described below.

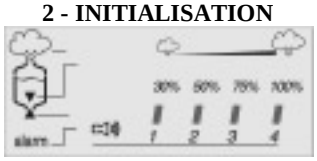
1 - POWER ON



In this phase, lasting around a second, all the LEDs on the display are illuminated.

Fig. 10.1.2.1

2 - INITIALISATION



Duration around 4 seconds. The LEDs highlighted here are all illuminated on the display of the control module.

Fig. 10.1.2.2

3 - OPERATION

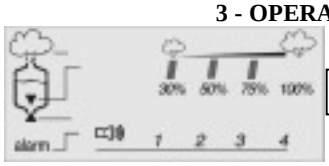


Fig. 10.1.2.3

The humidifier, if enabled performs the autotest, and thus begins operation; the control module indicates, on the four-stage bar graph (30%; 50%; 75%; 100%), the set steam production and, in the event of an alarm, the number on the relative bar code.

10.1.3 Display and control

Normally the panel shows the set steam production capacity, using the 4-stage bar graph (30%; 50%; 75%; 100%).
To change the set value press the ∇ and Δ buttons. The change to the set production is stored permanently.

10.1.4 Alarm indications

The illumination of LED 9 (see Fig. 10.1.1.1) and a combination of the LEDs 5 indicates the presence of a current alarm state; in the event of more than one alarms, the LEDs 5 are illuminated in sequence, at 2 second intervals.
At the same time, the control module activates the alarm relay (see **ELECTRICAL CONNECTIONS**).
To interpret the type of alarm, see **ALARMS AND TROUBLESHOOTING**.
The control module continues to indicate the alarm state (even if this is no longer active) until the reset button is pressed; still active alarms can not be reset.

10.1.5 Manual drain command

In the first 5 seconds from the start-up of the unit (during the autotest sequence: see Fig. 10.1.2.2), press the ∇ and Δ buttons at the same time. After 2 seconds the drain electrovalve is activated, until the buttons are released.
When the buttons are released, the command can be repeated within 5 seconds, otherwise the humidifier must be switched off and on again.

10.1.6 Setting the steam production

The average steam production can be adjusted using a pseudo-modulating action, with the cyclical activation of the remote-control switch and a programmable operating interval divided into four steps: 30%; 50%; 75%; 100% of the total time (this mode can not be applied in severe operating conditions and without consequences on the noise level caused by the frequent activation of the remote-control switch). To do this, use the ∇ and Δ buttons, see Fig. 10.1.1.1.

10.2 Type H or T control module, numeric LED display, modulating action

10.2.1 Front panel

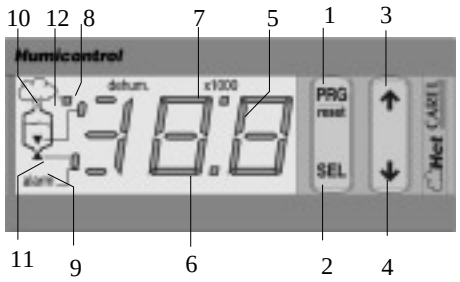


Fig. 10.2.1.1

n.	description
1	button for accessing the more frequently used functional parameters (codes **Px**, **dx**); it also acts as a reset button for the alarm relay (if the alarm is no longer active)
2	displays the unit of measure of the value shown on the display; pressed for 2 seconds accesses the display/programming of the Set Point; if pressed together with button 1 for 5 seconds, accesses the routine for programming the configuration parameters
3	while pressed, displays the value measured by the main probe (with ON/OFF control nothing is displayed); in programming mode acts as a button to decrease the value or scroll back to the previous parameter
4	while pressed, displays the value measured by the compensation probe (only if featured); in programming mode acts as a button to increase the value or scroll to the next parameter
5	2 ½ digit display to indicate the numeric values and codes of any active alarms; during programming shows the codes of the parameters and their values
6	LED representing the decimal point
7	LED for multiplying by one thousand the value indicated on the display
8	LED indicating the activation of the dehumidification relay
9	LED flashing indicating alarm relay activated
10	LED indicating current steam production; if flashing indicates the pre-heating phase
11	LED indicating operation of the fill electrovalve
12	LED indicating operation of the drain electrovalve

Tab. 10.2.1.1

10.2.2 Start-up sequence

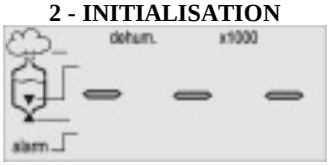
On starting-up the humidifier, the start-up sequence occurs, signalled by the illumination of the LEDs, as described below.

1 - POWER ON

In this phase, lasting around a second, all the LEDs on the display are illuminated.

Fig. 10.2.2.1

2 - INITIALISATION



Duration around 4 seconds. The LEDs highlighted here are all illuminated on the display of the control module.

Fig. 10.2.2.2

3 - OPERATION

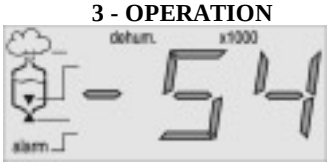


Fig. 10.2.2.3

The humidifier begins operation, and the control module indicates (see **REGULATION PRINCIPLES**) one of the following options:

- steam production (in %) with slave regulation;
- the measurement of the main transducer with autonomous regulation;
- when the humidifier is disabled, the 3 segments - - - are illuminated in sequence.

In the event of an active alarm, the LED next to the ALARM marking is illuminated and the display shows the relative code.

10.2.3 Display

The panel shows the current functional parameter programmed (with the code C0, see **Reading and programming the configuration parameters**).
Normally this is:

- the measurement of probe no. 1 (ambient humidity or temperature), in appliances with autonomous regulation;
- steam production in appliances with slave regulation.

Pressing the SEL button displays for one second the unit of measure of the measurement displayed.

Pressing the Δ button shows the measurement of probe 1 (if fitted), preceded for 1 second by the corresponding unit of measure. The display is valid even in the event where the probe is not connected.

Pressing the ∇ button shows the measurement of probe 2 (if fitted), preceded for 1 second by the corresponding unit of measure. The display is valid even in the event where the probe is not connected.

To display the Set Point (value of main setting):

- press the SEL button for around 2 seconds, until St appears (see Fig. 10.2.3.1);
- on releasing the button, the unit of measure of the Set Point is displayed for 1 second, and finally the current set value.

Fig. 10.2.3.1

Furthermore, the frequently-used functional parameters can also be displayed, that is those more commonly used by the appliance: to do this, follow the instructions in: **Reading and programming the regulation parameters - reading the measurements**.

10.2.4 Changing the Set Point

To change the Set Point (main regulation setting), follow the instructions in: **Reading and programming the Set Point**.

10.2.5 Alarm indication

In the event of an alarm state, the LED 9 (see Fig. 10.2.1.1) starts flashing, while the display shows the alphanumeric alarm code, alternating every 2 seconds with the programmed value of the functional parameter.
If more than one alarm is indicated, the display shows all the corresponding codes in sequence, at 2 second intervals.
At the same time, the control module activates the alarm relay (see **ELECTRICAL CONNECTIONS**). To interpret the type of alarm, refer to: **ALARMS AND TROUBLESHOOTING**. The control module will continue to indicate the alarm state (even if it is no longer active) until the reset button is pressed; still active alarm states can not be reset.

10.2.6 Manual drain command

In the first 5 seconds from the start-up of the unit (during the autotest sequence: see Fig. 10.2.2.2), press the ∇ and Δ buttons at the same time. After 2 seconds the drain electrovalve is activated, until the buttons are released. When the buttons are released, the command can be repeated within 5 seconds, otherwise the humidifier must be switched off and on again.

11. READING AND PROGRAMMING THE PARAMETERS OF THE TYPE H OR T CONTROL MODULE

The numerical, configuration and control panel parameters are grouped into three levels:

1. **LEVEL 1 - Set Point,** that is the value of the appliance's main setting **St**, accessible directly via the keypad for both reading and modification.
2. **LEVEL 2 - regulation parameters and measurements,** that is the physical vales measured and the functional parameters involving the regulation of the humidification process; these too can be accessed directly via the keypad for reading and modification.
3. **LEVEL 3 - configuration parameters** consisting of the data needed to customise the control, according to the requirements of the humidifier. These parameters are can be accessed only by password, to prevent the unwanted modification of the configuration and thus the humidifier's essential functions.

Each parameter is composed as follows:

code	alphanumeric symbol appearing on the display corresponding to the parameter in question
range of variation	limit values within which the parameter can be modified
default	value set in the factory for the parameter
unit of measure	symbol displayed showing the unit of measure used for the parameter

Tab. 11.1

Fig. 11.1

Warning: the numerical values from 200 a 255 are displayed with the symbol / in the place of the hundreds digit 2 (due to the specific constructive configuration of the display).
Figure 11.1 shows how the number 215 is displayed.

11.1 Reading and programming the Set Point

To read and/or change the Set Point, proceed as follows:

- press the SEL button for around 2 seconds, until St appears;
- on releasing the button, the unit of measure of the Set Point is displayed for 1 second, and finally the current set value;
- to change the Set Point, press the ∇ and Δ buttons, checking that the action is being performed on the display;
- press the SEL or PRG button to confirm the value displayed and conclude the programming of the Set Point.

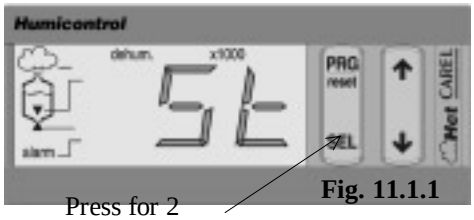


Fig. 11.1.1

The characteristics and the range of variation of the Set Point are listed in Table 11.1.1.

	unit of measurement	default value	minimum limit	maximum limit
type H control module	% rH	50	0	P7
type T control module (for steam baths)	°C	30	0	50

Tab. 11.1.1

11.2 Reading and programming the regulation parameters - reading the measurements

The regulation parameters represent the values relating to the process of ambient humidity (or temperature) control and are identified by a code ranging between P0 and P9, according to the criteria described in Table 11.2.1.
The readings are on the other hand the physical values measured by the transducers connected to the control, depending on the model and the setting of the humidifier, and the number of operating hours from the previous reset; the measurements are identified by a code ranging between d1 and d9 (see Tab. 11.2.2).

regulation parameters					
code on display	**range of variation**	**default**	**unit of measure**	**description**	
P0	10, ...100	100	%	maximum production in the event of modulation disabled (b0=0), the production is always at 100% of the nominal value, irrespective of the value of the parameter	
P1	2.0, .., 19.9	5.0	% rH	humidification differential	can only be accessed in autonomous regulation (A0=2 or 3)
P2	(P3), .., 100	100	% rH	high humidity alarm threshold	
P3	0, .., (P2)	0	% rH	low humidity alarm threshold	
P4	0, .., 6000	60	s	alarm delay	
P5	2, .., 100	10	% rH	dehumidification dead zone	can only be accessed with dehumidification function enabled (b1=2 or 3)
P6	2.0, .., 19.9	5.0	% rH	humidification differential	
P7	(St), .., 100	100	% rH	supply Set Point	can only be accessed in autonomous regulation with supply probe (A0=3)
P8	2.0, .., 19.9	5.0	% rH	supply differential	
P9	0, .., 100	100	% rH	high supply humidity alarm threshold	

Tab. 11.2.1

list of measurements					
code on display	**range of variation**	**default**	**unit of measure**	**description**	
d1 (1)	0, .., 100		%	measurement signal from external regulator	can only be accessed in slave or autonomous regulation (A0=1, 2 or 3)
			% rH	measurement from ambient probe	
d2	0, .., 100		% rH	measurement from supply probe	can only be accessed in autonomous regulation with supply probe (A0=3)
d3	0.0, .., 199	only	kg/h	steam production	
d4	0, .., 19900	reading	h	hour counter	
d5	0, .., 1500		µS/cm	conductivity	
d6	0, .., 100		°C	water temperature	can only be accessed with pre-heating function enabled (b1=1 or 3)
d9	0.0, .., 199		kg/h	nominal steam production	

Tab. 11.2.2

(1): in proportional operation (A0=1), d1 is expressed as a % of the working interval selected by A2; for information on A0 and A2: see Tab. 11.3.1.

To **display** the regulation parameters and the measurements, proceed as follows:

1. Press the PRG button for around 5 seconds until the code P0 appears, representing the first parameter (see Fig. 11.2.1);
2. Press the Δ or ∇ button to scroll cyclically through the Px and dx parameters, including the Set Point;
3. Press the SEL button to display the value of the selected parameter; the unit of measure of the parameter is displayed for 1 second;
4. Press the PRG button to conclude the programming phase.

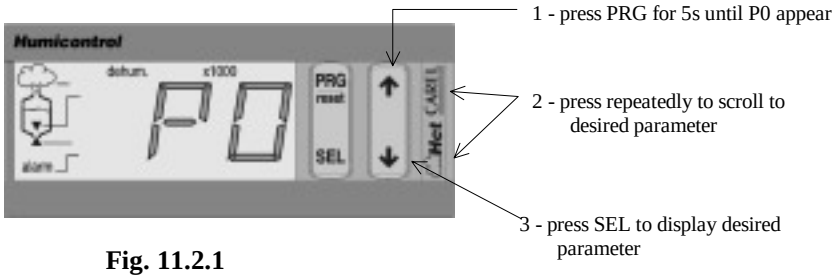

Humicontrol
P0
PRG
SEL
1 - press PRG for 5s until P0 appear
2 - press repeatedly to scroll to desired parameter
3 - press SEL to display desired parameter

Fig. 11.2.1

To **modify** the regulation parameters (the measurements can only be read), proceed as follows:

1. Press the PRG button for around 5 seconds until the code P0 appears, representing the first parameter (see Fig. 11.2.2);
2. Press the Δ or ∇ button to scroll cyclically through the Px and dx parameters, including the Set Point;
3. Press the SEL button to display the value of the selected parameter; the unit of measure of the parameter is displayed for 1 second;
4. Press the Δ or ∇ button to modify the value; keeping one of the buttons pressed increases the scrolling speed (see Fig. 11.2.3);
5. Press the SEL button to confirm the new value displayed; the identifying code Px or dx of the selected parameter will reappear;
6. Display and modify any other parameters, repeating steps 2 to 5;
7. Press the PRG button to permanently save the modifications and conclude the programming phase.

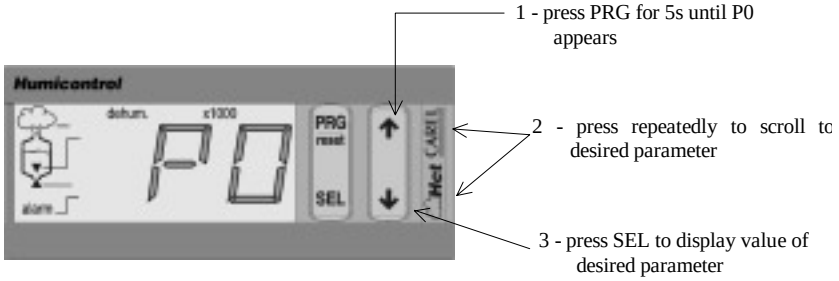

Humicontrol
P0
PRG
SEL
1 - press PRG for 5s until P0 appears
2 - press repeatedly to scroll to desired parameter
3 - press SEL to display value of desired parameter

Fig. 11.2.2

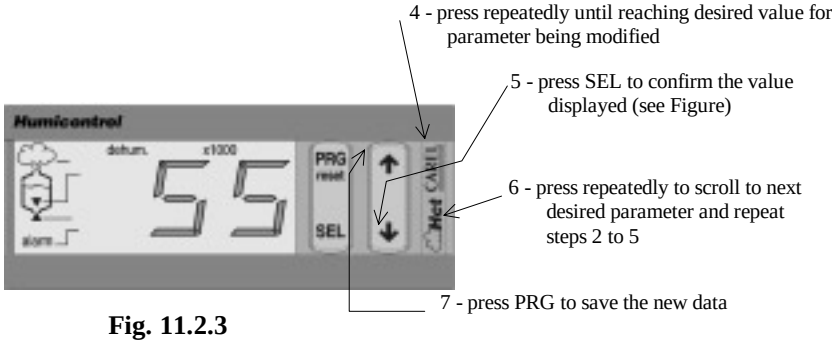

Humicontrol
55
PRG
SEL
4 - press repeatedly until reaching desired value for parameter being modified
5 - press SEL to confirm the value displayed (see Figure)
6 - press repeatedly to scroll to next desired parameter and repeat steps 2 to 5
7 - press PRG to save the new data

Fig. 11.2.3

11.3 Reading and programming the configuration parameters

The configuration parameters are used to set the operating mode of the controller, that is to assign the humidifier's essential functions.
The configuration parameters are divided into three groups:

- **Parameters for configuring standard operation** (operating mode and types of probes), identified by codes from A0 to A9: see Table 11.3.1.
- **Parameters for configuring the operation of accessory devices**, identified by codes from b0 to b7: see Table 11.3.2.
- **Parameters for the setting the serial connections and remote control**, identified by codes from C0 to C7: see Table 11.3.3.

These parameters can be accessed **only by password** to prevent the unwanted modification of the configuration.

parameters for configuring standard operation					
code disp.	**range of variation**	**default**	**unit of measure**	**description**	
A0	0,.., 3	3		operating mode	0=ON/OFF command 1= slave regulation 2=autonomous reg. with ambient probe 3=autonomous reg. with ambient probe and supply probe
A1	0, 1	0		unit of measure	0=°C, kg/h 1=°F, lb/h
A2	0, .., 4	1		signal applied to ambient probe input can only be accessed in slave or autonomous regulation (A0=1, 2 or 3)	0=0/1V 1=0/10V 2=2/10V 3=0/20mA 4=4/20mA
A3	0, .., (A4)	0	% rH	ambient probe minimum	can only be accessed in autonomous regulation
A4	(A3), .., 255 *****	100	% rH	ambient probe maximum	(A0=2 or 3)
A5	-10.0, ..., 10.0	0	% rH	ambient probe calibration	
A6	0, .., 4	1		signal applied to the supply probe input can only be accessed in autonomous regulation with supply probe (A0=3)	0=0/1V 1=0/10V 2=2/10V 3=0/20mA 4=4/20mA
A7	0, .., (A8)	0	% rH	supply probe minimum	can only be accessed in autonomous
A8	(A7), .., 100	100	% rH	supply probe maximum	regulation with supply probe
A9	-10.0, ..., 10.0	0	% rH	supply probe calibration	(A0=3)

Tab. 11.3.1

*****: see **WARNING** to side of Fig. 11.1.

parameters for configuring the operation of accessory devices					
code disp.	**range of variation**	**default**	**unit of measure**	**description**	
b0	0, .., 199	******	s	period of modulation (if set to 0 modulation is disabled)	
b1	0, .., 3	0		special functions can not be accessed in ON/OFF mode (A0=0)	0 = no function 1 = pre-heating 2 = dehumidification 3 = pre-heating and dehumidification
b2	2, .., 19.9	3.0	%	pre-heating start offset	can only be accessed with pre-heating
			% rH	(referred to the pre-heating	function enabled (b1=1 or 3)
b3	70, .., 90	80	°C	temperature Set Point)	
b4	0, .., 2000	0	µS/cm	supply water conductivity: if set to 0 the conductivity is measured automatically, otherwise, the set value is used	
b5	0, .., 2000	2000	µS/cm	conductivity pre-alarm threshold	
b6	0, .., 2000	2000	µS/cm	conductivity alarm threshold	
b7	0, .., 100	50	%	regulation of the foam detection threshold (if set to 0 foam detection is disabled)	

Tab. 11.3.2

******: the default value depends on the size of the humidifier.

parameters for setting the serial connections and remote control					
code disp.	**range of variation**	**default**	**unit of measure**	**description**	
C0	1, .., 6	1		normally displayed value	1= ambient probe measurement 2= supply probe measurement 3= steam production 4= hour counter 5= conductivity 6= water temperature
C1	0, .., 4	4		enable keypad and remote control	
				keypad:	remote control:
				0= reading of all parameters, (modification of C1 only)	reading and modification parameters P, d and St
				1= reading and modification of all parameters	reading and modification parameters P, d and St
				2= reading of all parameters, (modification of C1 only)	reading parameters P, d and St
				3= reading and modification of all parameters	reading parameters P, d and St
				4= reading and modification of all parameters	reading and modification of all the parameters
C2	0, .., 99	0		Code enabling remote control	
C3	0, .., 199	1		Serial address	
C4	0, .., 3	3		baud-rate	0=1200 1=2400 2=4800 3=9600
C5	0, .., 11	0		frame 0=8,N,2 1=8,N,1 2=8,E,2 3=8,E,1 4=8,O,2 5=8,O,1	(character bits, parity, stop bit) 6=7,N,2 7=7,N,1 8=7,E,2 9=7,E,1 10=7,O,2 11=7,O,1
C6	0, .., 199	0	ms	serial reply send delay	
C7	0, .., 3	0		graphic terminal configuration in cases 1,2,3 the OFF command is forced on start-up	0=standard terminal 1=terminal with ON/OFF command 2=term. with ON/OFF and ambient probe 3=term. with ON/OFF and supply probe

Tab. 11.3.3

To read or modify the configuration parameters, proceed as follows:

1. Press the SEL and PRG buttons together for around 5 seconds, until the code 00 appears, requiring the password to be entered (see Fig. 11.3.1);
2. Press the Δ or ∇ button until the **password** value is reached (number **77**);

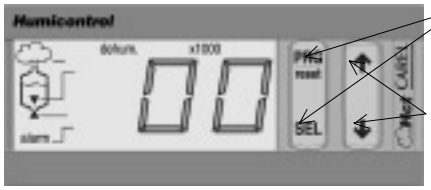

Humicontrol
00
PRG
SEL
1 - press SEL and PRG together for 5s until 00 appears
2 - press repeatedly to scroll to the password, 77

Fig. 11.3.1

3. Press the SEL button to confirm the password. If the password is not correct, the programming phase is terminated, otherwise A0 is displayed (see Fig. 11.3.2);
4. Press the Δ or ∇ button to scroll cyclically through the Ax, bx and Cx parameters, including the Set Point;
5. Press the SEL button to display the value of the selected parameter; the unit of measure of the parameter is displayed for 1 second;
6. Press the Δ or ∇ button to modify the value (keeping one of the buttons pressed increases the scrolling speed);

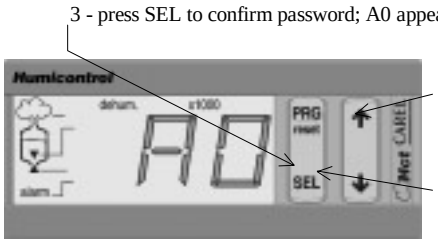

3 - press SEL to confirm password; A0 appears
Humicontrol
A0
PRG
SEL
4 - press repeatedly to scroll to desired parameter
5 - press SEL until the value of the desired parameter is displayed

Fig. 11.3.2

7. Press the SEL button to confirm the value displayed; the identifying code Ax, bx or Cx of the selected parameter reappears (see Fig. 11.3.3);
8. Display and modify any other parameters, repeating steps 4 to 7;
9. Press the PRG button to permanently save the modifications and conclude the programming phase.

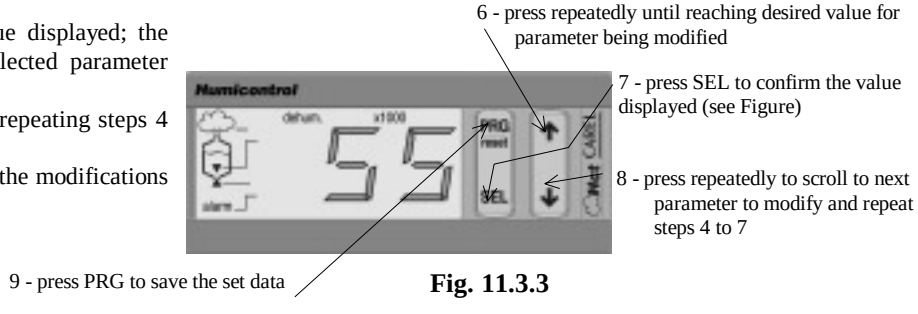

6 - press repeatedly until reaching desired value for parameter being modified
Humicontrol
55
PRG
SEL
7 - press SEL to confirm the value displayed (see Figure)
8 - press repeatedly to scroll to next parameter to modify and repeat steps 4 to 7
9 - press PRG to save the set data

Fig. 11.3.3

11.4 Validity of the modifications to the parameters

The modifications made to the parameters normally take effect when confirmed with the SEL button, and are saved permanently with the PRG button. For some parameters relating to the serial connection, the value will only take effect only the next time the unit is switched on. During the programming phase, 5 seconds after the last button is released, the display begins flashing (to remind the user that he is in programming phase). Sixty seconds after the last button is released, if the value of a parameter is being displayed, any modifications are ignored and the display returns to the parameter's identifying code. After a further 5 seconds, the display begins flashing again, and after 60 seconds the programming phase is terminated and the parameters return to the values previous to the programming phase. If, on the other hand, the parameter's identifying code is being displayed, the programming phase is terminated directly after 60 seconds (time out).

11.5 Recalling the default parameters (factory settings)

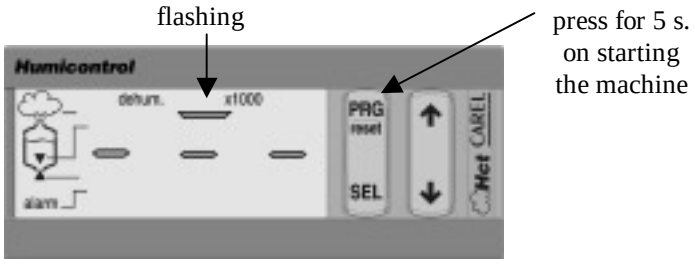


Fig. 11.5.1

The default values can be recalled only on start-up, and in the following way:

- in the first 5 seconds from start-up (while the three dashes are displayed), press the PRG button until the upper dash in the centre flashes, as indicated in the Figure;
- release the PRG button within 3 seconds to confirm the recall and permanent saving of the default parameters; to confirm the saving of the values, the upper dash will stay on for 2 seconds (as displayed in Fig. 11.5.1);
- the operation is not effected if the PRG button is pressed for more than 3 seconds, until the upper dash disappears.

Recalling the default parameters does not change the parameter relating to the unit of measure (A1), it is thus recommended to check and if necessary select and save the unit of measure as required, and then recall the default parameters. In this way the default values will automatically be converted.

Resetting the hour counter

To reset the hour counter (parameter d4), proceed as follows:

- press the PRG button for 5 seconds, until the code P0 is displayed, indicating the first modifiable parameter; using the ∇ and Δ buttons, scroll the parameters until d4 is displayed;
- press the SEL button to display the value of the hour counter (preceded for 1 second by the unit of measure);
- press the ∇ and Δ buttons together for 5 seconds until the value is set to zero, preceded by a brief flash.

11.6 Displaying and modifying the unit of measure

The unit of measure of some parameters depends on the type of control and the programming. Displaying the unit of measure can thus avoid incorrect interpretation. In the case of non-dimensional measurements, the unit of measure is not displayed. It is also possible to use imperial rather than standard units of measure (parameter A1). For the procedure to be followed please refer to: **Programming: accessing type A, b and C parameters**.
The two digits on the right are used to display the unit of measure:

display	unit of measure
°C	temperature in degrees centigrade
°F	temperature in degrees Fahrenheit
rH	relative humidity in %
Pr	steam production in kg/h
Lb	steam production in pounds/h

Tab. 11.7.1

display	unit of measure
M"	time in seconds
M'	time in minutes
h	time in hours
uS	conductivity µS/cm
o/o	percent

Tab. 11.7.2

12. THE REMOTE CONTROL (OPTIONAL ACCESSORY)

The remote control is an optional accessory and can only be used on humidifiers with type H or T control module (modulating).
It is available in two versions:

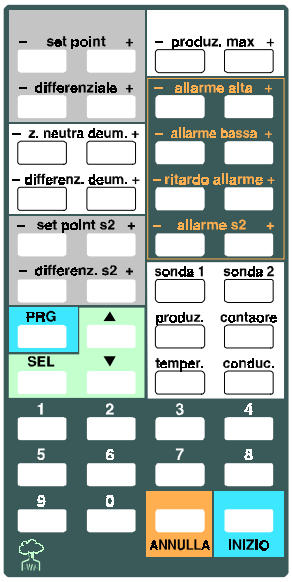


Fig. 12.1

- TELURI000 with buttons marked in Italian;
- TELURE000 with buttons marked in English.

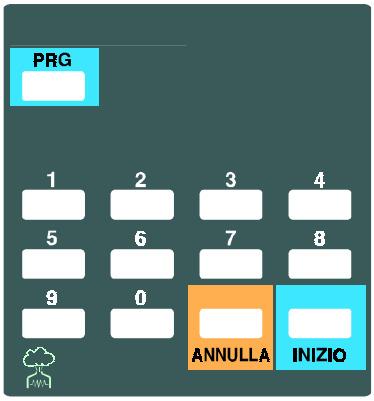
The infra-red remote control can command the call-up and display on the control module (see **THE HUMIDIFIER CONTROLLER**) of the humidifier's parameters, which, if necessary, can be modified remotely.
Furthermore, the remote control simplifies access to the main parameters, by pressing the corresponding marked buttons, avoiding the code search phase.
The remote control will operate at up to a distance of 3 metres, and can be used with all appliances in the heaterSteam family.
In the event where there is more than one humidifier within the remote control's operating range, the appliance to be operated can be determined by assigning each control module an individual **access code** (parameter C2).
Acting on the value of parameter C1 (see **Reading and programming the configuration parameters**) allows the parameters which can be read or modified using the remote control to be selected.
The standard value of C1 (default setting: C1=0) allows access to and modification of type P and d parameters and the Set Point only.

Description of the remote control

The buttons can be divided into three groups, according to their function.

Buttons for activating/deactivating the remote control

Allow the activation or deactivation of the remote control, saving the values associated with the parameters where necessary (see Fig. 12.1.1.1).



button	function
START	enables the use of the remote control
PRG	concludes the programming, saving the values attributed to the parameters where necessary
CANCEL	cancels any modifications
number buttons	set the access code to the parameters

Fig. 12.1.1.1

Buttons for modifying the main parameters (direct access buttons)

The more-frequently used parameters are indicated directly on the remote control, grouped into areas of different colours according to the function. Each modifiable parameter has a button with the + sign and one with the - sign to increase or decrease the value.
The buttons without + or - signs only allow the display of the associated value on the control module.

Buttons for the remote control of the control module keypad

The section highlighted in green/blue on the remote control (see Fig. 12.1.3.1) reproduces the buttons on the instrument and allows the same operations to be performed remotely; see **Reading and programming the parameters of the type H or T control module**.

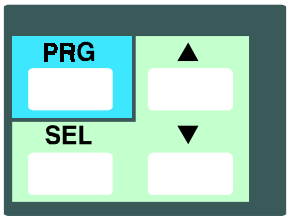


Fig. 12.1.3.1

button	function
PRG	permanently saves the values and exits the programming phase
SEL	displays the unit of measure and the value of the selected parameter confirms the modified value and displays the parameter code
▲	scrolls from one parameter to the next increases the value on the display during the setting of the parameters
▼	scrolls from one parameter to the previous decreases the value on the display during the setting of the parameters

Programming from the remote control

To activate or deactivate the access code to use the remote control, enter into the control module configuration mode using password 77 (see **Reading and programming the configuration parameters**).
Assigning parameter C2 a value other than 0 (from 01 to 99), activates this number as the access code which must be entered each time the remote control is used to program that unit.
Obviously, in installations with more than one unit, it is recommended to use a different code for each unit.
Setting parameter C2 back to 0 means the remote control can be used without requiring the access code.
When not in programming phase, the SEL (limited to the display of the unit of measure), PRG (limited to the function of alarm reset) and the display-only buttons are always active.

Enabling the control for receiving without requiring access code (C2=0)

Exit the programming phase if necessary, press the START button to enable the remote control; the humidifier's control module will show the code for the fist accessible parameter.

Enabling the control for receiving with access code required (C2≠0)

Exit the programming phase if necessary, press the START button to enable the remote control.
All the units located within the operating range of the remote control will display their own access code.
To access the programming/reading routine, use the numeric keypad (Fig. 12.1.1.1) to enter the access code for the machine to be operated on. Any zeroes must be included (e.g..: if the display shows 05, press the 0 and then the 5 button).
If the code is correct, the first accessible parameter is displayed.

Reading the measurements

To directly display one of the measurements provided for, press the corresponding button (Fig. 12.2.3.1) twice.

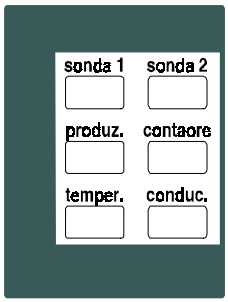


Fig. 12.2.3.1

Modifying the main parameters (with specific button)

With reference to Fig. 12.2.4.1:

- press either the + or - button corresponding to the parameter to be modified; the display shows the parameter code;
- press the SEL button again to display the value;
- then press the + or - button to increase or decrease the value.

The values in the memory of the control module will automatically be modified on exiting the programming phase.

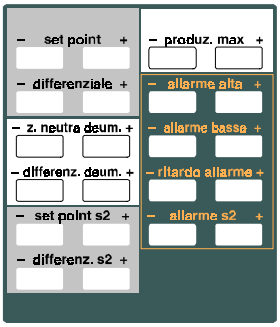


Fig. 12.2.4.1

Modifying the main parameters (without specific button)

The parameters without a specific button can also be modified, proceeding as follows:

- perform the operations for the enabling of the remote control;
- press the ∇ or Δ button until the code of the required parameter is displayed;
- press the SEL button to display its value; then press ∇ or Δ again to increase or decrease the value; finally, press SEL to temporarily confirm the new value;
- to modify other parameters, repeat the same operations.

Exiting the programming phase

To exit the programming phase and save the modifications made to the parameters, press the PRG button.
To exit without saving the modifications, press the CANCEL button.
To exit the programming phase without confirming the modifications made:

- do not press any button for 60 seconds, if the parameter code is displayed;
- do not press any button for 120 seconds, if the value of the parameter is displayed.

Table of remote control technical specifications

type	**description**
power supply	2 (two) 1.5V mini alkaline batteries (type UM-4 AAA, IEC R03)
case	plastic
dimensions (mm)	60 x 160 x 18
storage temperature (°C)	-25 ÷ 70
operating temperature (°C)	0 ÷ 40
type of transmission	infra-red
weight (g)	80 (without batteries)

Tab. 12.4.1

13. SHUTTING DOWN THE UNIT

When shutting down the unit at the end of the season or for maintenance on the electrical and/or hydraulic parts, the humidifier should be put out of operation.

The water should not be emptied from the cylinder before shutting down the humidifier to avoid the hardening of the deposits contained in the cylinder and thus making them more difficult to remove.

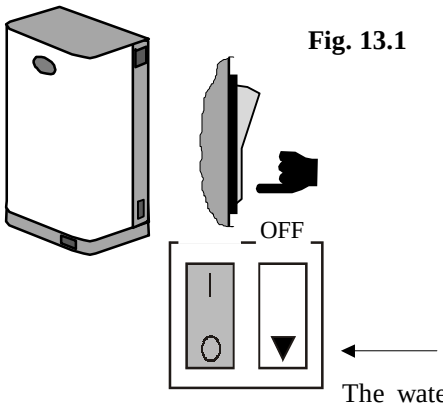


Fig. 13.1

Follow the instructions below (safety procedure):

- open the disconnecting switch on the power line to the humidifier;
- open the rocker switch in the lower right of the frame, (see Fig. 13.1) checking that the display on the control module is off;
- close the shut-off tap for the water supply to the humidifier.

If **the cylinder** needs to be **emptied** when shutting down to remove the deposits, before switching off power to the unit, press the DRAIN rocker switch, thus forcing the drain electrovalve to open, keeping it in this position manually until the water is completely emptied (see Fig. 13.1).

The water level can be seen through the level control housing and in the corresponding connection tube to the bottom manifold, on which the cylinder is inserted.

In the event of malfunctioning of the drain electrovalve, the cylinder can be emptied manually, by removing the connection tube from the level control housing spigot and slowly draining the water into the bottom collection tank.

The cylinder can also be emptied with the appliance closed, proceeding as follows on the control panel:

- turn the unit off using the rocker switch on the lower right of the frame (see Fig. 13.1);
- turn the unit on again;
- within 5 seconds from turning the unit on, press the Δ and ∇ buttons **together**;
- after 2 seconds the drain electrovalve is activated until the buttons are released; when the buttons are released, the command can be repeated within 5 seconds, otherwise the humidifier will need to be turned off and on again.

14. MAINTENANCE AND SPARE PARTS

14.1 Maintenance of the cylinder-boiler

For correct operation, the steam production cylinder must be periodically cleaned, at intervals linked to the quantity of salts or impurities dissolved in the supply water.
This operation is necessary as the lime deposits which form inhibit the exchange of heat between the elements and the water.

IMPORTANT WARNING: DO NOT USE DETERGENTS OR SOLVENTS TO CLEAN THE COMPONENTS IN THE CYLINDER AND ALL OTHER HYDRAULIC PARTS.

The unit must be cleaned in any case when the element over-temperature alarm is activated (see **ALARMS AND TROUBLESHOOTING**), signalled by:

- the illumination of LED 1 and 3, for the type C control module (see Fig. 15.1);
- the display of the message CL for the type H or T control module.

The cylinder may be hot! Let it cool before handling, or use protective gloves.

To access the cylinder:

- turn the appliance off (Fig. 13.1) and open the disconnecting switch on the power line (**safety procedure**);
- completely empty the water contained in the cylinder (see **SHUTTING DOWN THE UNIT**);
- open and remove the casing (see **Removing and replacing the front casing**).

The layout of the humidifier is as in Fig. 14.1.1:

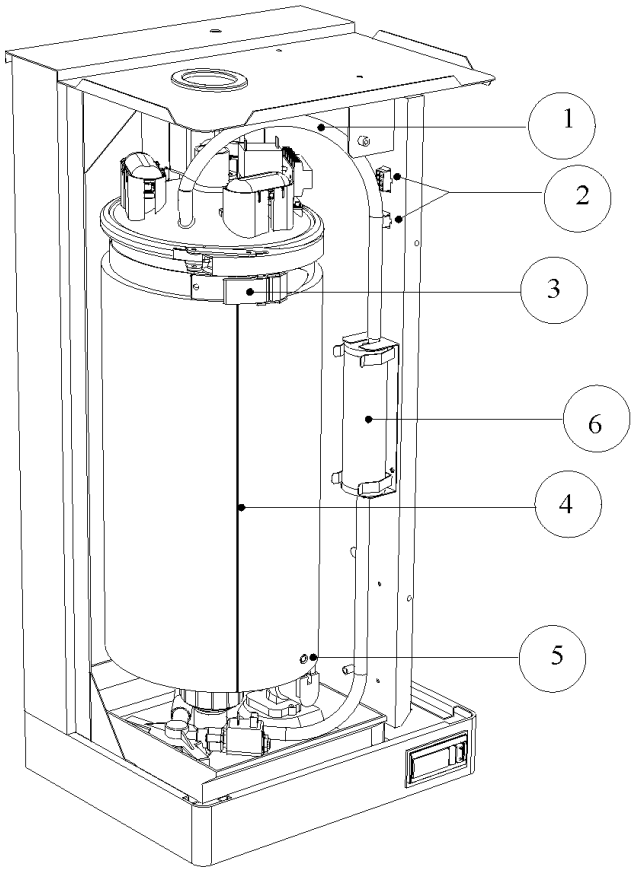


Fig. 14.1.1

n.	description
1	pressure balancing tubing
2	sensor connections
3	cylinder fastener closing
4	ext thermal lining (optional) with Velcro fastener
5	ground connection
6	level control

Tab. 14.1.1

To remove and clean the cylinder, follow the procedure as described:

Fig. 14.1.2

1. remove the steam tubing from the upper pipe union of the cylinder (Fig. 14.1.2);
2. disconnect the sensor quick connectors from the cylinder (Fig. 14.1.1, part. no. 2);
3. remove, from the cylinder cover , the pressure balancing tube with the level control tank (Fig. 14.1.1, part. no. 1);
4. remove the protective covers of the element electrical connections (Fig. 14.1.3, part. no. 3) and disconnect the power cables;
5. remove the cylinder ground screw (Fig. 14.1.1, part. no. 5);
6. undo the cylinder fastener by the lifting the black plastic lever (Fig. 14.1.1, part. no. 3) and pushing it to the end of its stroke, thus releasing the stop system;
7. lift the cylinder to remove the upper pipe union from the drain unit and remove it from the machine, paying attention to any drops of water or deposits which may be released from the pipe union;
8. if present, remove the external thermal lining (Fig. 14.1.1, part. no. 4), by opening the Velcro fastener;
9. place the cylinder on a working surface which is protected by a material resistant to the water and lime-scale which will be released during the cleaning operations;
10. release the cover ring fastening lever and push it to the end of its stroke (Fig. 14.1.3, part. no. 4); remove the metal ring and remove the plastic cover and connected parts from the cylinder (see Fig. 14.1.4, and exploded view of these parts).

Before handling the elements, ensure that they are not hot! Use protective gloves if necessary.

11. Remove the non-stick film (optional), if present, from the internal wall of the cylinder, and eliminate any lime deposits from this using a jet of water (see **Replacing the components**);
12. unscrew the ring nut on the lower cylinder pipe union and remove the bottom filter, which can be reused after cleaning any deposits; the gasket can be reused or, if damaged, can be replaced and ordered as a spare part;
13. the elements can also be cleaned without removing them from the upper cover; to do this, after having removed the flaky portion of lime, immerse the heating elements in a warm 20% solution of acetic acid for 30 minutes, removing the remaining surface deposits with a **non-metallic** spatula, then rinse well; **if the plates are Teflon-coated, avoid using any type of metal tools so as to not damage the non-stick layer**;
14. if necessary, the elements can be removed by unscrewing the fastening nut which holds them to the plastic cover; in this case the seal gasket should be replaced;
15. remove the deposits and rinse the internal walls of the cylinder and the probe wells (Fig. 14.1.4, part. no. 8).

Re-assemble the cylinder by repeating the above operations in the reverse order, **remembering to re-fasten the ground screw** (Fig. 14.1.1, part. no. 5).
The procedure described above refers to the three-phase version (see Figs.: 14.1.3 and 14.1.4), however, the procedure for the single-phase model is basically the same (see Fig. 14.1.5).
For the power connections, refer to: **Wiring diagrams for the connections of the elements at the headers**.

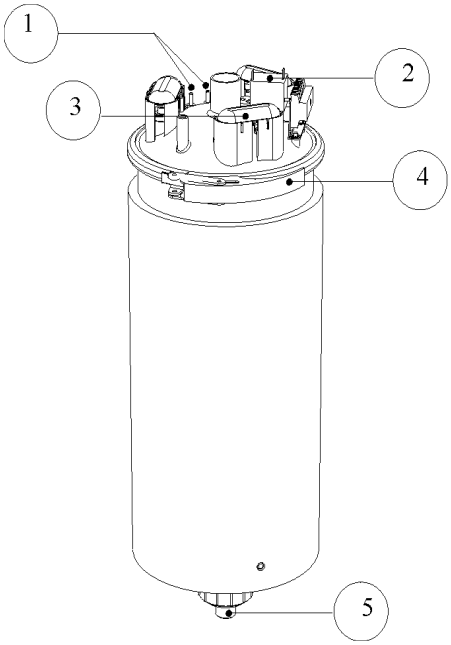
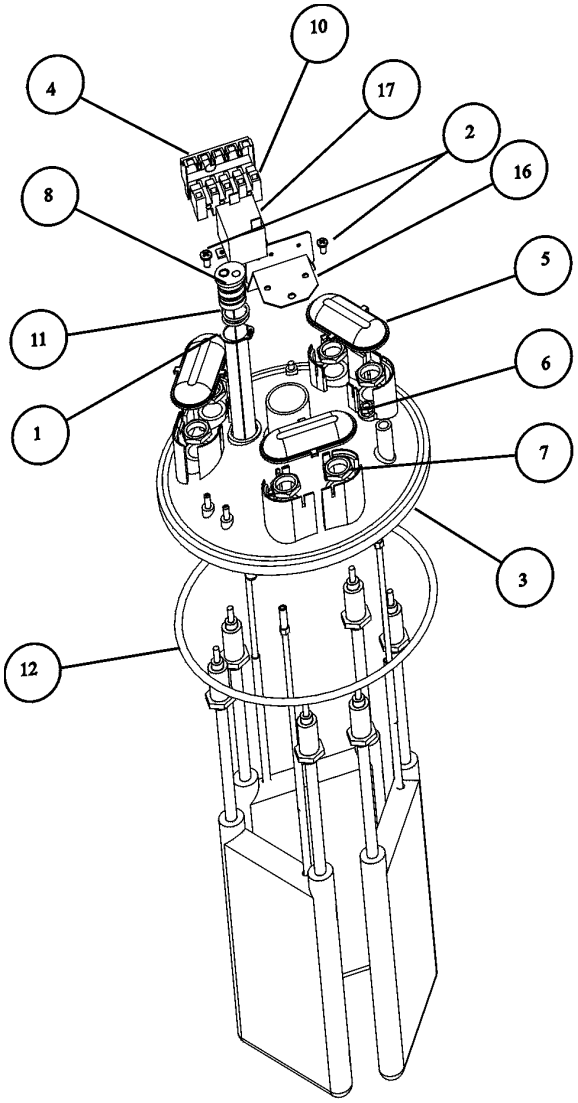


Fig. 14.1.3.

n.	description
1	high level sensor electrodes
2	safety thermostat reset button
3	protective cover
4	boiler cover fastening lever
5	pipe union with ring nut and filter

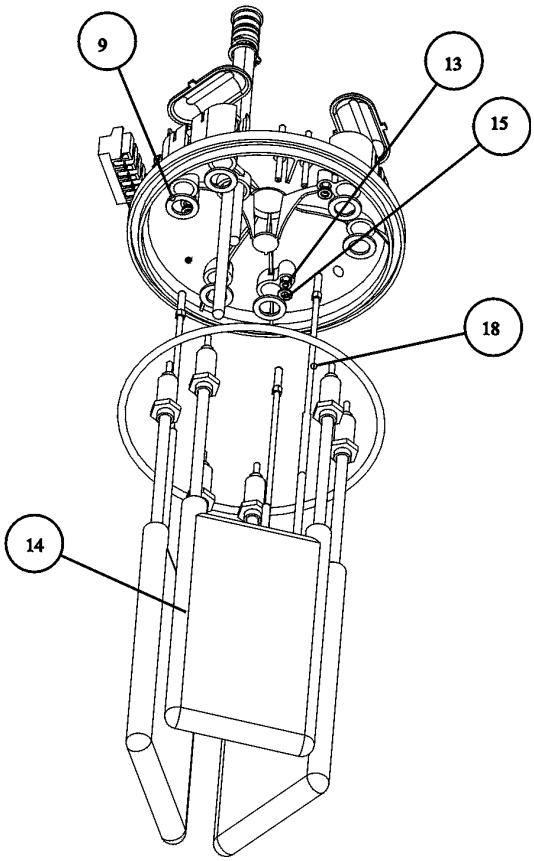
Tab. 14.1.3

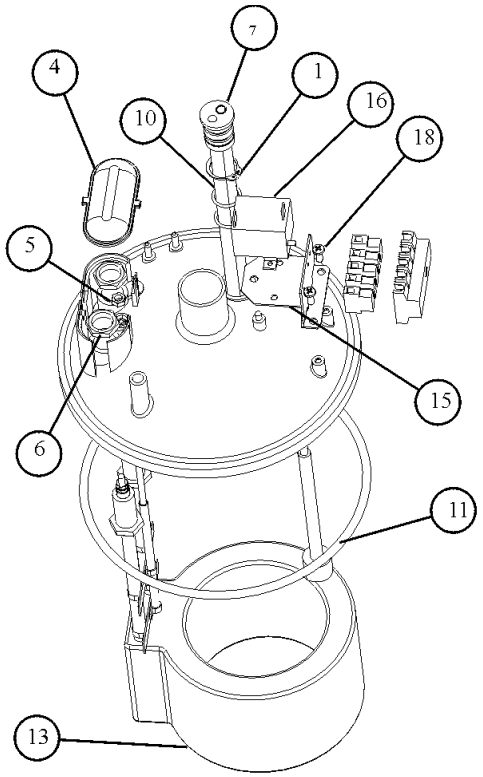


n.	description
1	fastening ring
2	safety thermostat bracket fastening screws
3	cylinder cover
4	PTC probe cable terminal cover
5	power connections protective cover
6	nut
7	depressed nut
8	double well for NTC and safety thermostat
9	flat gasket for elements
10	PTC probe cable terminals
11	O-ring (for double well)
12	O-ring for boiler
13	O-ring (for PTC probe)
14	electrical heating element
15	washer (for PTC probe)
16	bracket for safety thermostat
17	safety thermostat
18	PTC probe (element temperature control)

Tab. 14.1.4

Fig. 14.1.4

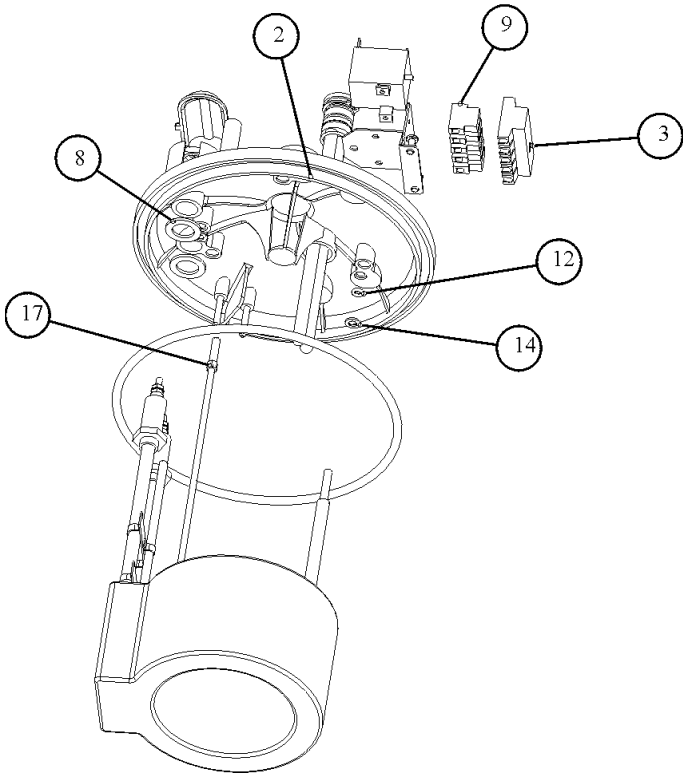




n.	description
1	fastening ring
2	cylinder cover
3	PTC probe cable terminal cover
4	power connections protective cover
5	nut
6	depressed nut
7	double well for NTC and safety thermostat
8	flat gasket for elements
9	PTC probe cable terminals
10	O-ring (for double well)
11	O-ring for boiler
12	O-ring (for PTC probe)
13	electrical heating element
14	washer (for PTC probe)
15	bracket for safety thermostat
16	safety thermostat
17	PTC probe tubing (element temperature control)
18	safety thermostat bracket fastening closing

Tab. 14.1.5

Fig. 14.1.5



14.2 Maintenance of the other hydraulic components

IMPORTANT WARNINGS:
DO NOT USE DETERGENTS OR SOLVENTS TO CLEAN THE PLASTIC COMPONENTS.
TO REMOVE THE DEPOSITS USE A 20% ACETIC ACID SOLUTION, THEN RINSE THOROUGHLY WITH WATER.

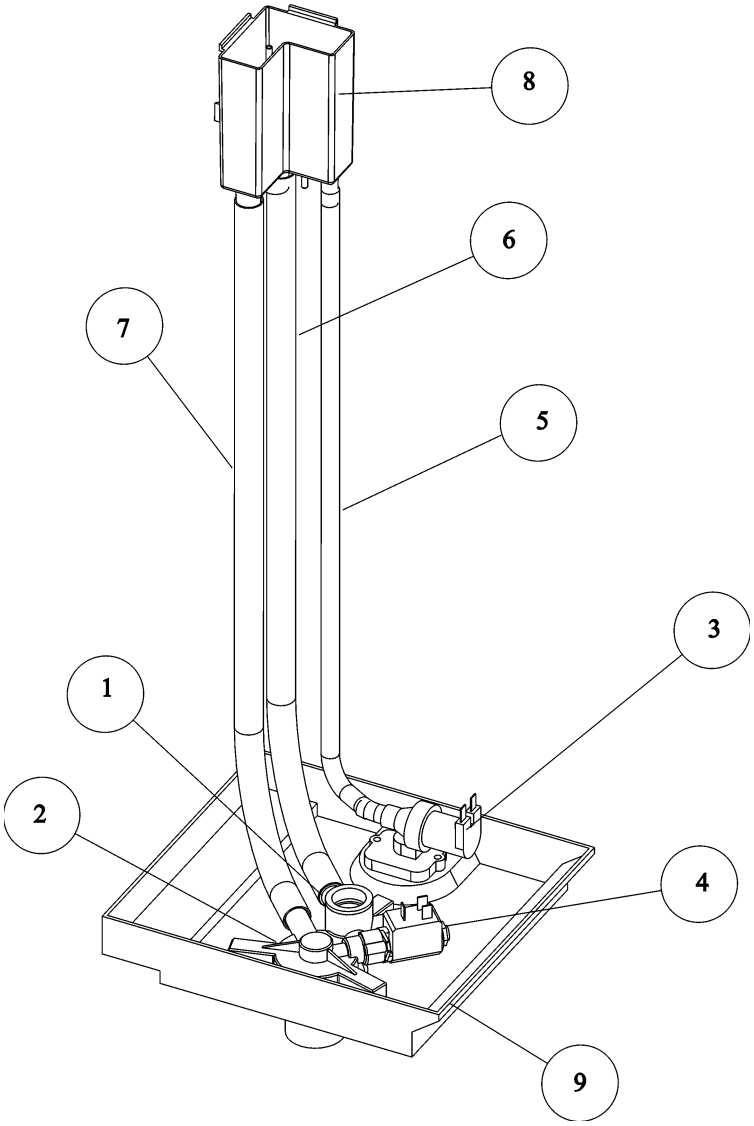


Fig. 14.2.1

n.	description
1	O-ring stop ring for S/D manifold
2	S/D manifold (supply - drain)
3	fill electrovalve
4	drain electrovalve
5	tank supply tubing
6	cylinder supply tubing
7	overfill tubing
8	fill tank
9	bottom tank

Tab. 14.2.1

- **Fill electrovalve** (Fig. 14.2.1, part. no. 3)

After having disconnected the cables and the tubing, remove the electrovalve and check the state of the inlet filter, cleaning it if necessary using water and a soft brush.

- **Supply and drain manifold** (Fig. 14.2.1, part nos. 1 and 2)

Check that there are no solid residues at the cylinder coupling; remove any impurities.
Check that the O-ring is not damaged or cracked; replace it if necessary.

- **Drain electrovalve** (Fig. 14.2.1, part. no. 4)

Disconnect the power cables, remove the bobbin and remove the valve block after having unscrewed the two fastening screws from the manifold; remove any impurities and rinse.

- **Bottom tank** (Fig. 14.2.1, part. no. 9)

Clean the tank for any deposits and check that water flows freely from the tank to the tubing.

- **Fill tank** (Fig. 14.2.1, part. no. 8)

Check that there are no blockages or solid particles and that the conductivity measuring electrodes are clean, remove any impurities and rinse.

- **Supply, load, overfill** tubing (Fig. 14.2.1, part nos. 5, 6 and 7)

Check that they are free and do not contain any impurities; remove any impurities and rinse.

- **Level control** (Fig. 14.2.2)

The level control (see Fig. 14.1.1, part. no. 6) is contained in a transparent cylindrical housing.
Disconnect the connector attached to the partition (see Fig. 14.1.1, part. no. 2), remove the device from the spring bracket, remove the connection tubing and the two covers.
Check that the O-rings are not damaged or cracked; replace them if necessary.
Check the cleanliness and free sliding of the two float switches.
Clean all the components and reassemble and replace the device.
Carefully check that the connection tubes are properly positioned and that they are not blocked or choked at any point.

n.	description
1	transparent polycarbonate cylinder
2	upper cover
3	O-ring (ORM 0300-20)
4	double float sensor
5	lower cover

Tab. 14.2.2

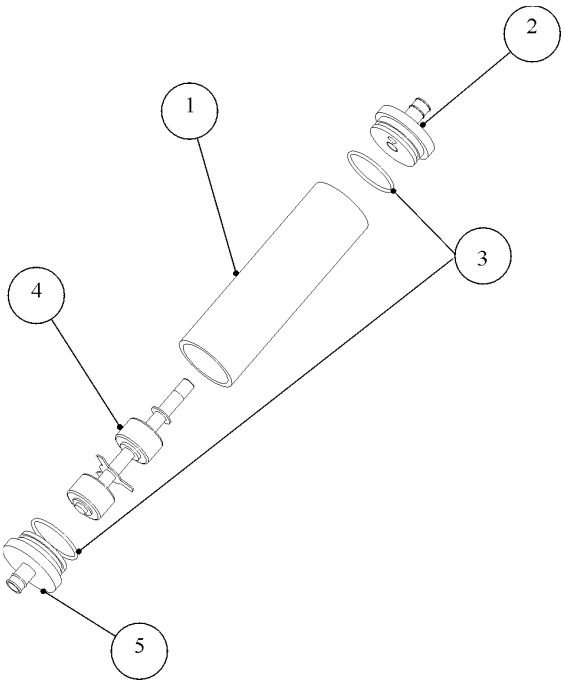


Fig. 14.2.2

IMPORTANT WARNING: **after having replaced or checked the hydraulic parts, check that the connections have been carried out correctly, with their corresponding seals. Re-start the machine and run through a number of fill and drain cycles (from 2 to 4), at the end of which, applying the safety procedure, check for any water leaks.**

Replacing the components

Non-stick film

If requested as an option, the internal wall of the cylinder is lined with a non-stick film to avoid lime being deposited on the internal walls of the cylinder. To clean or replace the film, remove the cylinder following the procedure described in **Maintenance of the cylinder-boiler** and then:

- slowly remove the film towards the mouth of the cylinder, without forcing it to avoid damage;
- open the film after having released the click-on couplings;
- clean the film with water and a plastic spatula if necessary; replace the film if damaged;
- wind the film around itself, reinserting the click-on couplings, and place it into the cylinder after the latter has been carefully cleaned and freed from deposits.

Elements

To replace the elements remove the cylinder following the procedure described in **Maintenance of the cylinder-boiler** and loosen the fastening nuts from the threaded spigots of the elements.
Before reassembling the elements, check the state of the gaskets and replace them if necessary.

Safety thermostat

To replace the safety thermostat remove the cylinder following the procedure described in **Maintenance of the cylinder-boiler** and then:

- disconnect the two fast-ons from the head of the thermostat;
- remove the bulb of the thermostat from the well which is **not market** with a coloured dot (Fig. 14.1.4, part. no. 8);
- remove the thermostat support bracket from the cylinder cover;
- replace the thermostat after having unscrewed the two fastening screws;
- replace the thermostat following the same operations in the reverse order.

PTC overtemperature sensor (optional in the version with type C control module, standard in the version with type H or T control module)

The PTC sensors (one for each heating element) do not require regular maintenance; they should only be replaced if the safety thermostat is activated due to operation without water: in fact, the intervention of just one PTC will cause the control module to shut-down operation.
To replace the sensors, remove the cylinder following the procedure described in **Maintenance of the cylinder-boiler** and then:

- disconnect the PTC sensor terminals from the ST terminal block located on the cylinder cover (see Figs.: 7.9.1, ..., 7.14.1);
- remove the electrical elements corresponding to the sensors being replaced;
- unscrew the PTC sensor (Fig. 14.1.4, part. no. 18 or Fig. 14.1.5, part. no. 17) using a spanner on the hexagonal spigot, accessible from the under side of the cover;
- reassemble a new PTC sensor, replacing the O-ring and screwing it tight; reconnect the terminals to the ST terminal block;
- reposition the electrical heating elements, making sure the PTC sensor enters into the corresponding sheath in the aluminium casting.

NTC temperature sensor (version with type H or T control module only)

As for the PTC sensors, the NTC sensor controlling the water temperature does not require regular maintenance.
To replace this sensor, remove the cylinder following the procedure described in **Maintenance of the cylinder-boiler** and then:

- disconnect the terminals of the NTC sensor from the ST terminal block located on the cylinder cover (see Figs.: 7.9.1, ..., 7.14.1);
- remove the sensor from the well (**marked** with a coloured dot) housed in the measuring sheath (Fig. 14.1.4, part. no. 8 or Fig. 14.1.5, part. no. 17);
- reposition and connect the new sensor in the place of the old one, making sure that it is completely inserted into the well.

Auxiliary circuit fuses

These measure 10.3 x 38mm and are housed in the fuse cartridge; to control the state of the fuses, check their continuity using a tester.
Use the types of fuses indicated in Tab. 14.3.6.1.

	models						
	UR002	**UR004**	**UR006 - 1~***	**UR006 - 3~****	**UR010**	**UR020**	**UR030**
fuses 1 and 2	all fast-blow fuses with 1A capacity						

Tab. 14.3.6.1

*: single-phase **: three-phase

Solid state relays (version with type H or T control module only)

The solid-state relays (one in the single-phase unit, two in the three-phase unit) can malfunction in one of two ways: by short-circuit or burn-out. The respective consequences for the supply of power are: continuous conduction or permanent opening.
In the event of malfunctioning, check the conduction of the relay using a tester.
For the replacement of the solid-state relay:

- turn the humidifier off;
- open the disconnection switch in the power line (safety procedure);
- disconnect the power and auxiliary cables from the solid-state relay terminal block;
- remove the relay from the electrical panel by using a screwdriver to lower the fastening lever to the omega guide;
- replace the new relay on the omega guide and reconnect the wires as before.

Cooling fan and circuit breaker (version with type H or T control module only)

The solid-state relays are cooled by a fan placed above the relays, on the right hand side of the appliance.
With insufficient ventilation the temperature of the electrical panel may rise excessively until, reaching 65°C, power to the solid-state relays is cut by a special klixon (heat sensor, used in this application as circuit breaker - hereafter: circuit breaker), with manual reset (indicated by S2 in the wiring diagram) and **without an activation signal**.
In this case, check:

- if the circuit breaker placed on the air conveyance deflector fitted above the solid-state relay intervenes on pressing the reset button (see Fig. 14.3.8.1);
- that the fan power board, fitted in front of the deflector, is powered (input terminals: 24Vac) and in turn powers the fan (output terminals: 24Vdc).

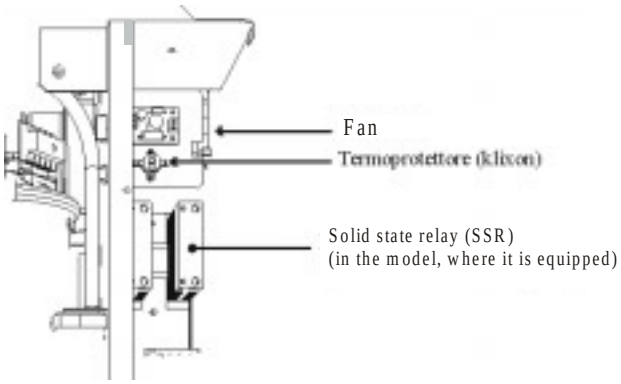


Fig. 14.3.8.1

If the fan is malfunctioning:

- remove the deflector, after having unscrewed the two side nuts for fastening to the partition of the appliance;
- replace the fan after having unscrewed the nuts for fastening to the side frame upright;
- reassemble the deflector correctly, as its positioning can influence the effectiveness of the cooling.

The circuit breaker can be replaced, in the event of malfunction, by removing it from the spring fastening it to the deflector.

14.3 Spare parts

model	UR002	UR004	UR006 - 1~*	UR006 - 3~**	UR010	UR020	UR030
hydraulic parts							
humidifier gasket kit	URKG00000M	URKG00000M	URKG00000M	URKG00000M	URKG00000M		
cylinder cover kit	URKCOPC00S	URKCOPC00S	URKCOPC00M	URKCOPC00M	URKCOPC00M		
cylinder cover fast. bracket	14C453A020	14C453A020	14C453A020	14C453A020	14C453A020		
cylinder filter kit	UEKF000000	UEKF000000	UEKF000000	UEKF000000	UEKF000000		
230V Teflon heating element	98C453P048	98C453P049	98C453P020	98C453P020	98C453P022		
230V non-Teflon heating element	98C453P066	98C453P067	98C453P056	98C453P056	98C453P057		
cylinder fastening strap	14C453A006	14C453A006	14C453A006	14C453A006	14C453A006		
steel cylinder	14C453A089	14C453A089	14C453A014	14C453A014	14C453A014		
fill tank	18C453A008	18C453A008	18C453A008	18C453A008	18C453A008		
drain electrovalve kit	98C453P050	98C453P050	98C453P050	98C453P050	98C453P050		
fill electrovalve	1312085AXX	1312085AXX	1312086AXX	1312086AXX	1312086AXX		
bottom tank	18C453A010	18C453A010	18C453A010	18C453A010	18C453A010		
internal tubing kit	URKT00000S	URKT00000S	URKT00000M	URKT00000M	URKT00000M		
control level with sensor	URKSLT0000	URKSLT0000	URKSLT0000	URKSLT0000	URKSLT0000		
cylinder fastening bracket	14C453A006	14C453A006	14C453A006	14C453A006	14C453A006		
non-stick film	13C453A085	13C453A085	13C453A035	13C453A035	13C453A035		
external insulation	16C453A054	16C453A054	16C453A024	16C453A024	16C453A024		
electrical parts							
contactor	0203000AXX	0203000AXX	0203000AXX	0203000AXX	0203000AXX		
power transformer	09C453A033	09C453A033	09C453A033	09C453A033	09C453A033		
fuse holder	0606192AXX	0606192AXX	0606192AXX	0606192AXX	0606192AXX		
fan	1312540AXX	1312540AXX	1312540AXX	1312540AXX	1312540AXX		
safety thermostat kit	URKTS00000	URKTS00000	URKTS00000	URKTS00000	URKTS00000		
double well for pre-heating probe + safety thermostat	14C453A077	14C453A077	14C453A042	14C453A042	14C453A042		
electronic parts							
version C control module	URCC000000	URCC000000	URCC000000	URCC000000	URCC000000		
version H control module	URCH000000	URCH000000	URCH000000	URCH000000	URCH000000		
version T control module	URCT000000	URCT000000	URCT000000	URCT000000	URCT000000		
main control board	URI0000000	URI0000000	URI0000000	URI0000000	URI0000000		
flat connection cable	59C460A003	59C460A003	59C460A003	59C460A003	59C460A003		
fan circuit breaker	6132702AXX	6132702AXX	6132702AXX	6132702AXX	6132702AXX		
fan control board	98C453CP04	98C453CP04	98C453CP04	98C453CP04	98C453CP04		
solid state relays	0101002AXX	0101002AXX	0101003AXX	0101002AXX	0101002AXX		
PTC probe	61C453A031	61C453A031	61C453A031	61C453A031	61C453A031		
NTC probe	NTC008WPAO	NTC008WPAO	NTC008WPAO	NTC008WPAO	NTC008WPAO		

Tab. 14.4.1

*: single-phase; **: three-phase

14.4 Disposal of the parts of the humidifier

The humidifier is made up of metallic and plastic parts, refer to Figs.: 2.1 and 14.2.1. All these parts must be disposed of according to the local standards regarding product waste disposal.

15. ALARMS AND TROUBLESHOOTING

15.1 Alarm summary table

When an alarm is activated a message identifying the alarm is displayed on the control module.
In the case of potentially dangerous alarms, the control module automatically shuts the humidifier down.
For some alarm events (see Table 15.1.1), the signalling of the alarm is accompanied by the activation of an alarm relay, as described in: **Other auxiliary contacts**.
If the cause of the alarm is no longer valid, the humidifier and alarm relay output can be reset automatically or manually, according to the type of problem, while the message displayed is deactivated manually by pressing the reset-PRG button.
If no longer active, the alarm status continues to be indicated until the reset-PRG button is pressed.
Still active alarms can not be reset.

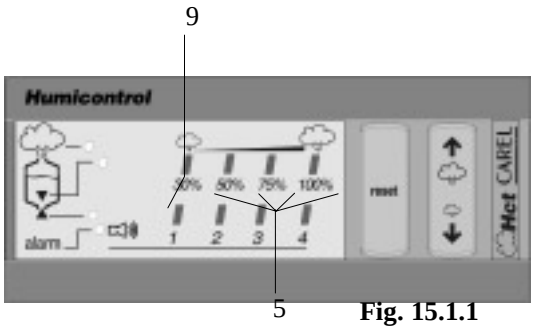


Fig. 15.1.1

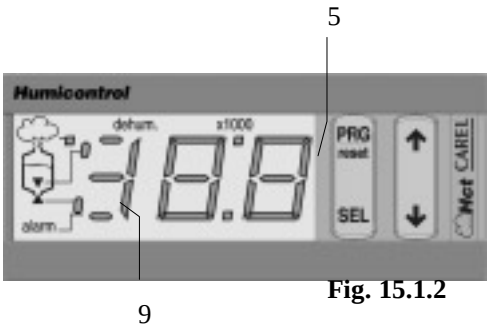


Fig. 15.1.2

In the type C control module the presence of an alarm is indicated by the illumination of LED 9 and a combination of the LEDs 5 (Fig. 15.1.1); in the event of more than one alarm, these are indicated in sequence, at 2 second intervals.
In the type H or T control module, if not in programming phase, in the presence of an alarm LED 9 (see Fig. 15.1.2) begins flashing, while the display 5 indicates the alphanumeric alarm code.
The message is displayed cyclically, for a duration of two seconds, alternating with the measurement normally displayed (if the measurement normally displayed corresponds to a disconnected probe, the measurement is not displayed; this will automatically return to the display if the probe is reconnected).
In the event of more than one alarm, the display indicates all the corresponding codes in sequence, at two second intervals.
The alarm Ec cannot be reset.
In the event of the alarm CL (regular maintenance required), the alarm can be reset only by resetting the hour counter; see **Resetting the hour counter.**

The alarm E1 may appear in two distinct cases:

1. **Malfunction when reading from the parameter memory** (typically on start-up)
   The default parameters are temporarily recalled, without being saved in the parameter memory (the parameters can be accessed and the correct values restored).
   In any case the default parameter recall procedure is recommended; see **Recalling the default parameters**.
2. **Malfunction when writing to the parameter memory** (typically on pressing the PRG button)
   Any modifications made will be cancelled; the parameters can be accessed, the values modified and save operation repeated.

Table 15.1.1 lists the alarm indications, the causes, the conditions and the possible solutions.
The **remote terminal** column indicates the alarm message which appears on the LCD display of the Carel Humivisor remote control panel, if one is connected to the humidifier.

code displayed							
H and T control	**C control**	**Carel Humivisor remote term.**	**cause**	**solution** (once having effected the suggestion, if the problem persists, contact the Carel service department)	**action**	**reset**	**alarm relay**
E L		E201	activation of safety thermostat	problem dependent mainly on operation without water; turn the machine off and, once it has cooled down, reactivate the thermostat on the cylinder cover after having cleaned the cylinder and the level control, checking the efficiency of the components; check that the electrical and hydraulic connections are in order and that the machine is supplied correctly; it may be necessary to replace the PTC sensors (if installed)	total shut-down	not avail.	active
E r		E203	the PTC probes of the heating plates have measured an overtemperature	turn the machine off and clean the cylinder and the heating plates	total shut-down	not avail.	active
E L		E204	low water level in the cylinder	check the correct supply of water to the cylinder; turn the machine off and clean: the cylinder, the level control and the fill electrovalve	total shut-down	not avail.	active
E C	Not featured	E205	high conductivity of the supply water	turn the machine off and clean the water conductivity measuring electrodes; if the problem persists, change the source of the supply water or install a suitable treatment system (demineralisation, even partial); the problem will not be resolved by softening the supply water	total shut-down	auto	active
E E		E211	autotest failed; probable problems in: supply water, level control or electrovalve	ensure that the machine is supplied with water; turn the machine off and clean the level control and the fill valve	humidifier disabled	manual	active
E P		E213	electrical power not available; on machine start-up no steam is produced or the water is not pre-heated	with the machine off and disconnected from mains power supply, check that there are no defective of malfunctioning electrical connections	humidifier disabled	manual	active
E F		E214	lack of water	check that the supply tubing from the water supply to the humidifier and the internal tubing is not blocked or choked and that the pressure is sufficient (1÷8 bar); check the operation of the fill electrovalve; check that the steam supply does not have to work against excessive back-pressure, preventing the flow of water into the cylinder due to gravity; check that the steam supply tubing is not choked or that there are no pockets of condensation	humidifier disabled	manual	active
E A		E215	formation of foam in the cylinder during boiling.	the formation of foam is usually due to the presence of surfactants in the water (lubricants, solvents, detergents, water treatment or softening agents) or an excessive concentration of dissolved salts. Drain the water supply line; clean the cylinder	humidifier disabled	manual	active

Tab. 15.1.1
continua

cont.

code displayed							
H and T control	**C control**	**Carel Humivisor remote term.**	**cause**	**solution** (once having effected the suggestion, if the problem persists, contact the Carel service department)	**action**	**reset**	**alarm relay**
E c	not featured	E231	high water conductivity pre-alarm	check the conductivity of the supply water; if necessary, install a suitable water treatment system; the problem will not be resolved by softening the supply water	humidifier disabled	auto	not active
E ¯	not featured	E221	high ambient humidity (high temperature in T control)	check the operation of the probe and the limit set by parameter P2	signal only	auto	active
E _	not featured	E222	low ambient humidity (low temperature in T control)	check the operation of the probe and the limit set by parameter P3	signal only	auto	active
E -	not featured	E224	high supply humidity	check the operation of the supply probe	signal only	auto	active
E 0		E201	internal memory error	contact the Carel service department	humidifier disabled	Carel re-program	active
E 1	not featured	E212	user parameter error	with the machine off check that there are no defective or malfunctioning electrical connections	humidifier disabled	re-program params.	active
E 2	not featured	E230	hour counter error	reset the hour counter (see **Resetting the hour counter**)	hour counter saving disabled	reset manual hour counter	not active
E 3	not featured	E220	ambient probe not connected	check the connection of the probe and the setting of parameter A0 for ON/OFF configuration (see **Reading and programming the parameters**)	humidifier disabled	auto	active
E 4	not featured	E223	supply probe not connected (if featured)	check the connection of the probe or the setting of parameter A0 (see **Reading and programming the parameters**)	humidifier disabled	auto	active
E 5	not featured	E225	NTC probe for measuring the water temperature not connected (if featured)	check the pre-heating operation and the setting of parameters b1, b2, b3 (see **Reading and programming the parameters**); check the connections to the terminal block on the cylinder cover	pre-heating disabled	auto	active
C L	not featured	E232	regular maintenance signal	stop the machine and carry out a complete maintenance routine on the humidifier, resetting the hour counter (see **Resetting the hour counter**)	signal only	manual	not active

Tab. 15.1.1

15.2 Troubleshooting

problem	cause	solution
The control does not turn on.	1. no electrical power supply; 2. external switch in position 0 (open); 3. control connectors poorly installed; 4. fuses blown; 5. transformer malfunction;	1. check the protection devices before the humidifier and the presence of the mains power supply ; 2. close the switch: position I; 3. check that the connector are properly installed on the terminal block; 4. check the state of fuses F1/F2; 5. check that the secondary of the transformer has an output of 24Vac
The humidifier does not enter into operation	1. remote ON/OFF contact open (relay/terminals 7I - 8I); 2. the external regulator/humidistat or probe has not been connected correctly; 3. probe/humidistat malfunction; 4. parameters not set correctly; 5. safety thermostat activated; 6. fan circuit breaker activated (control H or T);	1. close ON/OFF contacts (relay/terminals 7I - 8I); 2. check the external connection; 3. check the external signal; 4. reprogram the parameters correctly; 5. reset the thermostat after having eliminated the cause of the problem; 6. reset the circuit breaker after having eliminated the cause of the problem;
The humidifier fills with water without producing steam	1. steam supply back-pressure too high; 2. loss of flow regulator in the water fill electrovalve (with leaks in the hydraulic circuit); 3. level control malfunction; 4. cylinder inlet filter blocked; 5. lime in the fill tank; 6. drain electrovalve malfunction;	1. check that the steam supply tubing is not bent or choked; 2. replace the fill electrovalve; 3. clean or replace, if necessary, the level control; 4. clean the filter; 5. clean the fill tank; 6. check for the presence of 24Vac at the drain electrovalve; clean drain electrovalve;
Line circuit breaker is activated	1. the line circuit breaker is rated too low; 2. elements short-circuited	1. check that the circuit breaker is rated for a current of at least 1.5 times the rated current of the humidifier; 2. check, by measuring, the value of the elements and replace them if necessary
The humidifier wets the duct	1. the distributor is not installed correctly; 2. the system is rated too high; 3. the humidifier is active when the duct fan is off;	1. check that the steam distributor has been installed correctly; 2. diminish the steam production set on the control; 3. check the connection of the device (flow switch or differential pressure switch) linked to the humidifier for ventilation in the duct (terminals 7I - 8I)
The humidifier wets the floor below	1. the humidifier tubing is blocked; 2. the hydraulic supply or overfill circuit has leaks; 3. the drain condensation tubing does not drain the water back to the fill tank; 4. the steam supply tubing is not properly attached to the cylinder;	1. clean the tubing in the bottom tank; 2. check the entire hydraulic circuit; 3. check the correct positioning of the condensation drain tubing in the fill tank; 4. check the fastening of the pipe clamp on the steam supply tubing;

Tab. 15.2.1

16. HUMIDIFIER TECHNICAL SPECIFICATIONS

model	UR002	UR004	UR006	UR010	UR020	UR030
number of heating elements	1	1	3	3		
steam						
connection (ϕ mm)	30					
supply pressure limits (Pa)	0 ÷ 1500					
supply water						
connection	G¾"M	G¾"M	G¾"M	G¾"M	G¾"M	G¾"M
temperature limits (°C)	1 ÷ 40					
pressure limits (bar)	1 ÷ 8					
hardness limits (°fH)	≤ 40					
instantaneous flow rate (l/min)	0.6	0.6	1.2	1.2		
drain water						
connection (ϕ mm)	40					
typical temperature (°C)	≤100					
instantaneous flow rate (l/min)	5	5	5	5		
environmental conditions						
ambient operating temperature (°C)	1 ÷ 40					
ambient operating humidity (% rH)	10 ÷ 60					
storage temperature (°C)	-10 ÷ 70					
storage humidity (% rH)	5 ÷ 95					
index of protection	IP20					
control						
type	URCC-URCH-URCT					
voltage / auxiliary frequency (V / Hz)	24 / 50÷60					
maximum auxiliary power (VA)	30					
probe inputs (general characteristics)	selectable input signal: 0-1Vdc, 0-10Vdc, 2-10Vdc.0-20mA, 4-20mA input impedance: 60 kΩ with signals: 0-1Vdc, 0-10Vdc, 2-10Vdc 50 Ω with signals: 0-20mA, 4-20mA					
power to active probes (general characteristics)	24Vdc (24Vac rectified), Imax=250mA 12Vdc 5%, Imax=50mA					
alarm relay and dehumidification outputs (general characteristics)	250V 8 A (2 A) type of micro-switching action 1C					
remote enabling input (general characteristics)	free contact ; max. resistance 50 Ω; Vmax=24Vdc; Imax=5 but					
serial communication	two-lead RS-485					

Tab. 16.1 - cont.

continued

model	UR002	UR004	UR006	UR010	UR020	UR030
power						
rated power supply voltage: 200V - 1~N	code C	code C	code C			
instantaneous steam production (1) (kg/h)	1.8	3	6			
power consumption a rated voltage (kW)	1.3	2.3	4.5			
rated power supply voltage : 208V - 1~N	code C	code C	code C			
instantaneous steam production (1) (kg/h)	2	3.2	6.1			
power consumption a rated voltage (kW)	1.5	2.5	4.6			
rated power supply voltage : 230V - 1~N	code D	code D	code D			
instantaneous steam production (1) (kg/h)	2.4	4	6			
power consumption a rated voltage (kW)	1.8	3	4.5			
rated power supply voltage : 200V - 3~			code J	code J		
instantaneous steam production (1) (kg/h)			6.0	10.0		
power consumption a rated voltage (kW)			4.5	7.5		
rated power supply voltage : 208V - 3~			code W	code W		
instantaneous steam production (1) (kg/h)			6.2	10.0		
power consumption a rated voltage (kW)			4.6	7.5		
rated power supply voltage : 230V - 3~			code K	code K		
instantaneous steam production (1) (kg/h)			6.0	10.0		
power consumption a rated voltage (kW)			4.5	7.5		
rated power supply voltage : 380V - 3~			code L	code L		
instantaneous steam production (1) (kg/h)			5.5	9.0		
power consumption a rated voltage (kW)			4.1	6.8		
rated power supply voltage : 400V - 3~			code L	code L		
instantaneous steam production (1) (kg/h)			6.0	10.0		
power consumption a rated voltage (kW)			4.5	7.5		
rated power supply voltage : 440V - 3~			code M	code M		
instantaneous steam production (1) (kg/h)			5.5	9.1		
power consumption a rated voltage (kW)			4.1	6.9		
rated power supply voltage : 460V - 3~			code M	code M		
instantaneous steam production (1) (kg/h)			6.0	10.0		
power consumption a rated voltage (kW)			4.5	7.5		

Tab. 16.1

(1) the average steam production is affected by factors such as: ambient temperature, water quality, steam distribution system

model	UR002	UR004	UR006	UR010	UR020	UR030
VENTILATED STEAM DISTRIBUTOR models	**VSDURA**	**VSDURA**	**VSDURA**	**VSDURA**		
rated power (W)	34	34	34	34		
air flow rate (m^3/h)	175	175	175	175		
noise level (open range, at maximum speed at a distance of one metre from the front) (dBA)	46	46	46	46		
operating temperature / humidity (°C / % rH)	-10÷40 / 10÷60	-10÷40 / 10÷60	-10÷40 / 10÷60	-10÷40 / 10÷60		

Tab. 16.2

16.1 Guarantee on materials

The parts making up the humidifier are covered by a 2 year guarantee from the date of production, printed on the adhesive label listing the product identification data. The guarantee does not cover the consumable parts (e.g.. the cylinders). The guarantee is void if the cause of the malfunction is clearly due to tampering or careless or improper use of the instrument by the customer, or if the identification label is missing.

Carel reserves the right to modify or change its products without prior warning.

CAREL

Technology & Evolution

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Cod. +030221761 - Rel. 2.0 - 03/09/99